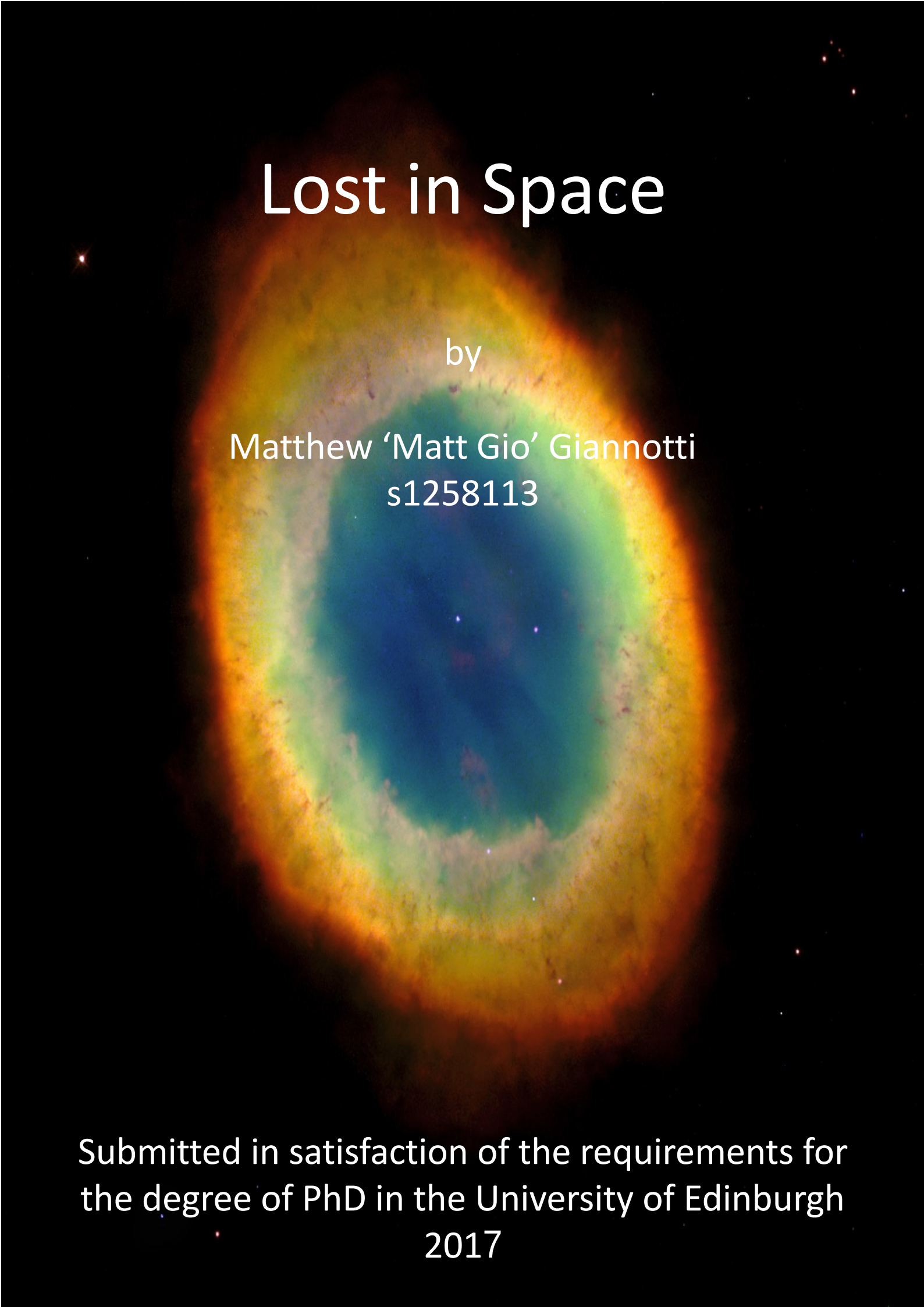
Lost in Space



by

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Submitted in satisfaction of the requirements for the degree of PhD in the University of Edinburgh 2017

Lost in Space

2016

String quartet
Electronics/laptop
Narrator
Projection artist

Dur: 40’

Lost in Space is a 40-minute show which combines a narrator (astronomer), music, and either 2 or 3D projections. The piece is modular in that it can be run with a minimum of two or three people using pre-recorded strings (a live presenter, someone to run sound, and an optional person to run visuals), or it can be performed with up to seven people by adding an amplified live string quartet. The recorded string parts are included along with the MaxMSP patch, and the patch itself can be configured for either live and pre-recorded strings, which are then processed in real time.

Attached are four documents: a Cue list, which is a top-level document used by the entire team to see where the visuals, script, and score line up (including the string cues); the patch documentation; a script, which includes the narrator’s part; and the string quartet score, which is a mix of metered as well as aleatoric music. On the Data USB stick, there is a movie which has the 2D visuals, audio, and narration and is a very good approximation of how the live show will look and sound.

Contents:

Program note:
*“*What is it like to be human in a vast and violent universe? Deep in the Milky Way, with rocks raining on the Earth, are we just pointless specks of dust? The answer may surprise you. Join Andy Lawrence on an immersive journey through the Universe, with music, words, and 3D graphics.*”*

Lost in Space

Background: *Lost in Space* started as a 10-minute collaboration with Andy Lawrence at the SCART Connections during the Edinburgh International Science Festival (EISF 2014). From there, we began working with Projection artist, Robert Motyka, and had over 25 more shows, reaching over 2,000 audience members. The shows were split between the EISF and the Edinburgh Open Days at the Royal Observatory in 2015 and 2016.

The music for the show is a series of electronic drones, sound effects, and 10 string cues – which are a mixture of traditional measured music and unmeasured textures. Strings 3 and Strings 7 are perhaps the furthest from traditional, as Strings 3 uses small cells and a graph to designate intensity, while in Strings 7, a series of cues help to line up a melody with unmeasured cells below.

Looking more broadly, *Lost in Space* is the first piece in the portfolio that touches on all aspects of style that are more fully realized in later pieces. This is done by combining the elements above with static harmonies, rhythmic cycles, and expressive melodies.

Elements: On the Data USB stick, there is a folder containing all the files required to perform the sound for the show: '03_LiS_LiveElectronics'. In this folder, the laptop performer will use the 'zMaster.maxpat' file, documented on page 7, to control how the audio progresses through the show.

Seemingly chaotic, the patch is set up to have control over the necessary elements to ensure a smooth show. For example, having the ability to set mic levels with the click of the mouse is handy, especially when the house system is prone to feedback. In addition, there are many automated elements which help make the live performance flow as smoothly as possible. Briefly - the patch has controls for routing the narrator's mic input (as well as the live string inputs), volume faders for string and drone files, granulation, remote control input (for sound effects), reverb, and various sine wave drones which are then passed through granulation. This contains all the controls one would need perform the show correctly according to the cue list.

The version of the patch included is for a 2.1 stereo and bass speaker setup, however this has been performed in the past with a 4.1 setup. Some of the sound effects work very well on 4 speakers, including the lightning effects which can be panned front/back instead of simply left/right. One of the highlights is a very low rumble (1Rumble.wav) which, when played by a powerful bass speaker, has the ability to shake a small room. The vast majority of the volume sliders are attached to some kind of automatic fader, controlled by a single button press. For example, when one clicks on the button that says 'Strings1', it will automatically start playing the sound file while fading in the volume to the correct level over the correct number of seconds.

The other files in the '03_LiS_LiveElectronics' folder are: (a) the sound effects (1Rumble.wav-5Ice.wav), (b) the drones (61.wav-69.wav), (c) the MaxMSP patch files (Autovol.maxpat-Staff4.png), (d) the string excerpts (Strings1.wav-Strings12.wav [Strings 2 and 4 were cut]), and lastly (e) the last set of max patches including the sub-patch masters and the overall master.

HUMANITY IN A VAST AND VIOLENT UNIVERSE

Words by **ANDY LAWRENCE** Music by **MATT GIANNOTTI**
Projection by **ROBERT MOTYKA** Images by **the UNIVERSE**

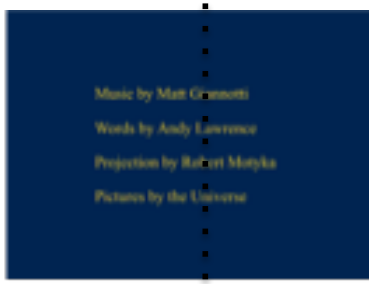
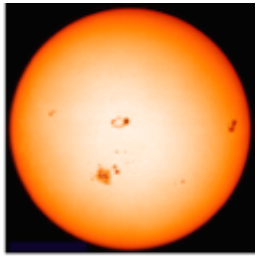
MUSICIANS
Aisling O' Dea - Violin
Marcy Buta - Violin
Zoe Matthews - Viola
Clea Friend - Cello
Donald Bell - Recording Engineer

We are grateful for support from many colleagues at the Edinburgh College of Art, the Institute for Astronomy, the National Museum of Scotland, Pufferfish Ltd, Piotr Motyka, and the Edinburgh University Festivals Team.

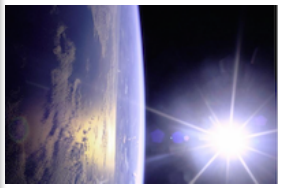
IMAGE CREDITS
European Southern Observatory (ESO); European Space Agency (ESA); NASA; Rogelio Bernal Andreo; John Lemivex; Dave Lane; Florian Breuer; UKIRT; John Tyman; Alfred Eisenstaedt; Walter Nowotny; Nordic Optical Telescope; Gordon Mackie; Christian Ude; DRA Schwarz; Vlad Studio; J.Brew; Max Alexander; Rick Guidice; Don Davis; Colby Gutierrez-Kraybill; Seth Shostak; L.Calcada; Utagawa Hiroshige, Don Goldmann, David Malin

Lost in Space

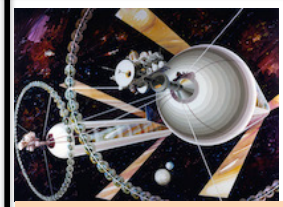
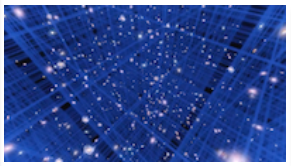
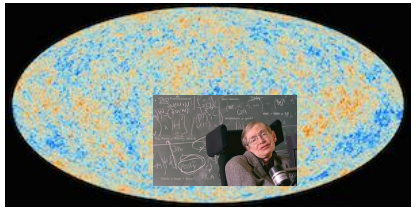
Cue list

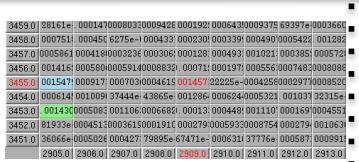
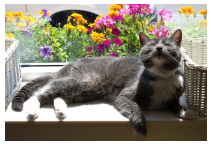
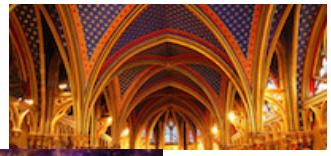
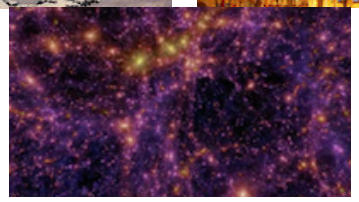
Time	Key Visuals	Key Words	Music	House
-5m			Sine Wave 1 (C) Auto Vol	Doors open Audience settles
0m			Strings 1 – AV Off	Lights down
4m		**Intro**	Sine 2 – (F) Half way, 2nd run up	
	 	*Welcome everybody…*	Sine 3 – (D) Drone 1	
7m		**Immensity**		
		*So lets begin… The universe is big. Its very, very big. Its hard to get your head around. It can be … **unsettling**…*	SE1-rumble	
	 	*Begin at Earth…* *Earth – Sun – frozen edge – stars….*		

Time	Key Visuals	Key Words	Music	House
		*With our infra-red cameras we see deep inside the Milky Way. There **are billions and billions of stars..***	SE-rumble	
		*Pushing deeper through space, there are more and more galaxies… we have seen no end to the vastness of space.*	Drone 2 Sine 3 off	Immediate
12m		**Violence**	Strings 3	
		*The Universe dwarfs us, not just in size, but in power. It is almost unimaginably violent…*	SE2-thunder	
	 Flare clip	*Bomb…Oppenheimer-Shiva-Sun …* ***Ten billion bombs every second***		
		*Supernova .. As bright as billions of suns*	Strings 5 SE2-thunder	

Time	Key Visuals	Key Words	Music	House
	 Chelyabinsk clip	*Supernova shreds-crashing galaxies-black holes –aurora – meteors – **one in my hand***	Chelyabinsk audio	
		*Comet-LA-tidal-wave – meteor crater … **It will happen again***	Strings 6 – Gran 1,1,1	Immediate
21m		**We are stardust**	QUICK	
	 	*Universe is scary but it is our home…*	Drone 3 –Gran off 1,2,4 (120)	
	 	*At a nice safe distance its just enough to keep us warm…*	SE3 -birds	
24m			Drone 4	At smiley Lady
	 	*All of it is just recycle solar energy*	SE4 -river	
28m		**Interlude**		

Time	Key Visuals	Key Words	Music	House
			Strings 7	
			Sine Wave 3 (D) Vol 110?	
32m		**Complexity**		
	 	*Life seems so rich – is that really true?*	Sine Wave 2 (F)	
		Galaxy- cathedral-code-DNA-library of books	Drone 5	When Andy Starts
	 	***Inside every head is the British Library**. We are the most complex things we know.*	Drone 6	
			Stop Sine Wave 2	
37m		**Ubiquity**		
	 	*But wait... This picture of a galaxy hides a lot of detail...*	Strings 8	
		Mars- Europa Ice – wobbling stars – teeming with planets – but life?	SE5 - Ice	
		*Aliens visit – too expensive – **all of the world's energy budget for a year***		

Time	Key Visuals	Key Words	Music	House
	 	*Space ark – send signals –* ***We've seen nothing yet, but keep watching..***		
42m		**Eternity**	Drone 7	
		*We wait ..but our lives are short.. All things must pass..*	Strings 9	
		Sun - gamma-ray-burst - star cycles – univese expanding – start with Big Bang	Drone 8	Birth and Death
	 	***Is the Universe heading for a sparse cold future?***	Stop Drone 8 Strings 10	
47m		**Meaning**	Sine 4 (G), then Sine 3 (D)	
		*Our heads are spinning trying to take this all in..*	Drone 9	
		*Inky blackness – starfield – nebula – CMB – Hawking* ***Like looking at the face of God***	SE6 - twinkles	

Time	Key Visuals	Key Words	Music	House
	 	*If there is a deep thought..* ***The Universe is made of numbers***	Strings 11	
51m	**Outro**			
	 	*At the end of this long journey we run out words…*		
	 	*Stare in wonder – universe – life - human creation*		
	 	***And at our imagination and understanding, that can bring them together…***		
		That's all… And thank you for travelling with us today	At animation Strings 12 Gran 1,1,1 Drone 1	Applause Lights up Doors Open Audience out
53m				

Digital to analog converter – turn this on first.

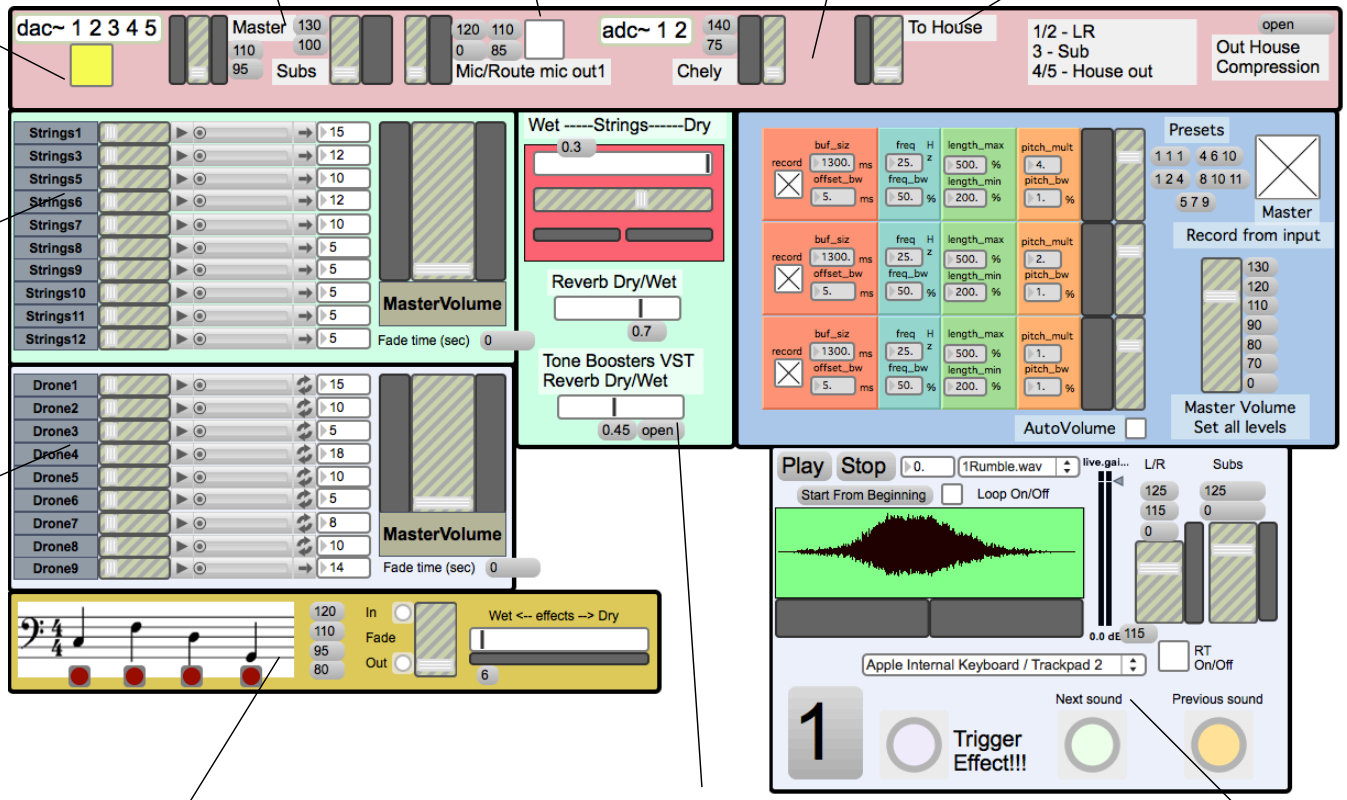
Master volume and volume to bass (sub) speaker

Volume for mic and toggle for on/off

Chely is a volume level for an additional laptop input from the projection artist

Additional output for any house system

This is the patch that controls the granulation. The ‘Master Record from input’ toggle, when on, will take playback from the sine drones and strings and process them. The presets control the pitch shifting and refer to the overtones (so 1 2 4 would be the fundamental, first octave and 2nd octave). Lastly, the ‘AutoVolume’ is for the beginning of the show changing the volume on a slow sinusoidal curve.



This is the string and drone bank. Press the button that says ‘StringsX’ or ’DroneX’ to trigger the sound.

It will automatically start playing, with a pre-programmed volume fade. The number to the right of the playbar indicates the time for the fade (it changes for the fade out)

The ‘MasterVolume’ is an additional gain control which is useful at the beginning or end of the show (automatic 5sec fade).

This section is for an additional drone (a simple sine wave), triggered by the button below each note. The Wet<->Dry is how much it will be run through the granulation patch.

This box is for a wet<->dry for string granulation which will be the main control. The other reverb and tone boosters likely won’t be used. Reverb is convolution and tone boosters is a vst that can be see by pressing ‘open’.

The Sound effects box – this can be triggered by a remote triggering device (RT Device toggle). The RT device will have the same effect as pressing the ‘Trigger Effect’ button. Following the cue list, the performer will press the ‘Next’ or ‘Previous sound’ so the spoken word performer only has to worry about triggering the sound.

Lost in Space - Script for POS version May 2017

Opening Drone

===INTRO====
We live in an astonishing universe…
… but it seems remote from our human concerns
- our lives, our loves, our hopes, our fears.
How should we feel, Deep Inside the Milky Way?
Let's travel out and take a look.

Intro sequence/music

Drone change

=====IMMENSITY==========
So let's begin.

HDF

Rumble

The Universe is big; it's very very very big
It's so big it can be … unsettling

Earth

Let's start at home; planet Earth.
It's a ball of rock covered with a thin skin of water and air
that we crawl around.

Sun

We circle around the Sun.
The Sun is a burning ball of gas.
It dwarfs the Earth.
You can fit a million Earths inside the Sun.

receding sun

Our orbit around the Sun
is another 200 times bigger than the Sun itself.
If we move out through the solar system
there are more rocks, more planets,
circling around the Sun, at larger and larger distances
until …as we get right out
to the frozen edge of the solar system,
past the dwarf planet Pluto,
out to the Oort Cloud of Comets, looking back,
the Sun looks like just another star.

Plough

But the rest of the stars,
even the nearest stars,
are *much* further away…
thousands of times further away than Pluto…

As we stare out at the sky,
there seems to be so *many* of them.
We get the impression of an endless sea of stars.
But… it's *not* a formless infinity…
… we see a *pattern* to the stars..

MW1

Look out on a good dark night;
arcing across the sky
there is a fuzzy strip of light: the Milky Way.

MW2

That milky strip tells us
that we live inside a giant disc of stars.
As we look out through the disc,
the most distant stars blur together.
You can see this with your own eyes;
lie on your back, staring at the Milky Way,
and you can feel yourself inside that giant wheeling disc.
It's where you live.

IR MW and zoom

Add a giant telescope, and infra-red cameras,
and we can see deep inside the Milky Way.

Rumble

There are billions and billions of stars.

Drone change

======VIOLENCE==========

The universe dwarfs us, not just in size, but also in power.
It's almost unimaginably violent.

bomb

The scariest thing humanity has made is the atomic bomb.
An atomic bomb can flatten a whole city.
It has the potential to destroy our civilization.

+ Oppenheimer

The father of the atomic bomb, Robert Oppenheimer,
was haunted by the horror of what he had unleashed.
As he watched the first desert test,
he thought of lines from the Hindu scripture, the Bagavad Gita

- "I am become Shiva the destroyer of worlds."

+ Shiva

In that moment, Oppenheimer also thought
that the sky had become brighter than a thousand suns.

The Sun and The Bomb are intimately linked.
The way that energy is unleashed in a Hydrogen Bomb

sun prominence

is just the same as the way that the sun makes its own power
- by smashing Hydrogen atoms together and fusing them into Helium.

But Shiva would be laughing.
The power emerging from the sun is equivalent
to ten billion atomic bombs exploding every second.

explosion

Ten billion bombs, every second.

But that's just the start.
Some stars will end with a whimper and some with a bang.
When a star ends its life in a supernova explosion,
briefly, for a few weeks,
it can be as bright as a billion suns.

before and after

In 1054 AD Chinese astronomers saw a supernova explosion
in the constellation of Taurus.
We look there now and all we see,
a thousand years later, is expanding shreds of gas.

crab

thunder

Deeper out into space
entire galaxies are crashing into each other
at hundreds of km per second,
twisting and distorting under the pull of their own gravity.

int. gals

Giant black holes can pull material in,
and spit some of it back out,
at nearly the speed of light.
If a poor star gets too close to such a giant black hole,
it can get shredded,
ripped apart by the tidal forces.

Her A

TDE movie

But the dangers are not just a distant spectacle
- they are right here on Earth

From the cold northerly parts of the world,
we can see shimmering curtains of light
- the Aurora Borealis, the Northern Lights.

Thurso Aurora

They are very beautiful - but also quite dangerous.
The Northern Lights are produced by high energy particles
streaming out of the Sun, across space,
and crashing into the Earth's atmosphere;
they make the atmosphere *glow*.

The particles causing that ethereal glow
are dangerous to life;
only our atmosphere protects us from them.

Meteors Hawaii

Keep watching the sky any night, anywhere,
and you will see something else beautiful but dangerous
- shooting stars.

Shooting stars are small pieces of rock
- maybe the size of a pea -
which are crashing into the Earth's atmosphere.
As they compress the air they heat up and burn,
making a brief streak of light.

Meteor Loch Ness

Every so often a slightly bigger piece of rock arrives.
Something the size of a potato
makes a much brighter streak - a fireball -
and doesn't burn all the way up.
The remaining rock lands on the surface of the Earth,
where we can pick it up - a meteorite.

rock in hand

I am holding one, right here.
This piece of rock, in my hand,
is four and a half billion years old.
It came from space; crashed into the air,
made a luminous streak,
and thumped into the earth.

And here it is in my hand.

Chelyabinsk movie

Sometimes something rather bigger arrives.
In 2013 a rock 20 metres across roared through the air
and exploded above Chelyabinsk in Northern Russia.
It was recorded on dashboard cameras by hundreds of people.

The shock wave shattered windows. People were hurt.

Comet 67P

That was 20m; what about 3km?
That's the size of the comet
visited by the Rosetta spacecraft in 2014.

Comet + LA

Here it is imagined next to the city of Los Angeles
What would happen if something that big
crashed into the Earth's atmosphere?

Satellite breakup

Very likely it would break up into many fragments,
and each one of those fragments
would explode or crash into the Earth.
Most of the pieces would land in the oceans.
Each one could cause a tidal wave
that would travel around the globe
and devastate a city.

tidal wave-1

tidal wave-2

Such events are very very rare.
But here and there the surface of the Earth
is scarred with enormous craters.
We know that it has happened before;
and it will happen again..

Arizona crater

Drone change

===WE ARE STARDUST====

So… the Universe is unimaginably vast;
it's extremely scary;
but it is our home.
We come from the stars.

pretty starfield

The atoms that we're made of were fused
in an earlier generation of stars.
Some of those stars, as they ended their lives,
will have exploded or expanded,
pushing their atoms out into space.
Those atoms spread across the interstellar medium,
and then began to collect together again,
and condense into new clouds.
Pockets of gas collapsed on themselves…
and made new stars.

Helix

Veil Nebula

Orion Nebula

Pleiades

And so the cycle continues.

Some of the leftover atoms will form rocks;
those rocks can coagulate into planets;
and so finally here we are,
at home on planet earth.

icy planet

Earth

As we sit here on our rock,
life is feeding on the energy of the Sun.
The Sun may be horrifically violent,
but its a long way away.

Earth and Sun

At the nice safe distance of the Earth,
the Sun simply keeps us - warm.

cat birdsong lizard face

Everybody likes to bask in the warmth of the Sun.
But it's more than just pleasant.
The Sun is the source of all our weather,
and all of life.
It lifts the water up into the air;
the water falls again as rain;
and the plants drink.

forest

rain

Without the Sun
there'd be no clouds, no grass, no cows;
the Sun is the source of everything we know and love.

cows

Without the Sun there'd be no human life.

Edinburgh

It's behind all of our civilization and accomplishments;
even our proudest technological breakthroughs.
Here we are, with our shiny rockets,
struggling back towards the stars at last.

rockets

But all of this, all of it, is just recycled solar energy.

interlude sequence

=== COMPLEXITY======

drone change

Life seems so rich, so complex; is that really true?

Let us compare people and galaxies.

I am staring at a picture of the majestic spiral galaxy, M83.
It's very big; it's very beautiful;
but there's not a lot to say about it.
It's got blue bits and red bits;
its brighter in the middle, it's kinda swirly.
Just how complicated is it?

M83

Now I stare at the interior of a Cathedral -
a majestic human creation.
I can see patterns within patterns;
structure on all scales;
repeats and not quite repeats;
it strikes me as being very rich and complicated.

Wells cathedral

But maybe I am fooling myself.
After all, as people,
we will react to things that other people make.

Can we be objective about this?
What would it take to make a galaxy?
I have friends who fake galaxies for a living.
In other words, they simulate them on their computers.
To do that you need to write lots of lines of computer code.
To make a really good simulation of a galaxy
you need perhaps fifty thousand lines of code.
In other words, a fat book full of computer code.

code

Now suppose we want to make a *person*. How do we do that?
Well, the instruction manual for making a person is our DNA.
The DNA molecule is a long chain.
At each position along the chain,
you can choose one of four units;
Cytosine, Adenosine, Guanine, Thymine.
So it's like a kind of code.
Or if you like, a string of letters
taken from a very short alphabet, CAGT.
The long chain reads CG,GA,ATCG, CCGAT… and on and on
If we take the whole long string -
how big a book would that be?
The answer is - it's a thousand books.
To make a person you don't need a book,
you need a whole library.

DNA

test tube

library

What about the information inside my head?
The accumulated knowledge and experience?
That's a much more difficult calculation.
Nobody really knows.
But some people have argued it's more like a *million* books.
In other words, inside every head, your head, my head,
is the whole of the British library.

British library

+me

We are the most complex things we know.

====UBIQUITY=====

drone change

But… maybe I have been too hasty,
underselling the complexity of a galaxy.

M83

I look again at my picture of M83.
I realize that my picture is hiding a lot of detail.
I know that in this galaxy
there is something like a hundred billion stars;
but in my picture they are all blurred together.

IR MW

Inside our own Milky Way,
I can see all the stars one by one,
each one a separate dot in the sky.
Does every one of those dots hide a civilisation?
Or are we alone?
We could be the pinnacle of creation.
Or we could be a lucky fluke.
Or the Galaxy could be teeming with life.
How will we know?

Mars

Let's look closer to home, on the planet Mars.
We've been to Mars a number of times -
well, we've sent our machines there..
and on the surface of Mars our machines
have performed chemical experiments
to look for signs of life…
… and so far… nothing.

Europa

Where else in the solar system might life be hiding?
People have hopes for Europa.
Its covered with a sheet of ice.

ice sheet

crackle

Some people think that underneath that ice
primitive life may be hiding.
Maybe some day we will get there and find out for sure.
But for now…
it looks like we are probably the only life in our solar system.

51 Peg movie

But what about all those other stars?
Do they even have planets?
In my childhood this question would have been impossible to answer.
Now we know of hundreds of nearby stars that have planets.
We can see the wobbles the planets cause,
or the tiny dips of light,
in their parent stars.

So the Milky Way seems to be teeming with planets.

But do they have life?
How we are going to know?

Maybe… if there are civilizations on the planets
around these other stars …
maybe they come to visit us?
UFO
Even if those stories of UFOs and abductions are just fantasy,
maybe it *could* happen?

It's very very very unlikely.
Let me tell you why.

The distances between the stars are vast.
If you are going to travel quickly -
to hop, from one star to another,
over a few days or a few weeks,
then you need to get your spacecraft up to nearly the speed of light.
Now we don't know how to do that.
But even if we did,
what we do know is that it's very very expensive.

Suppose I take the Space Shuttle
and want to accelerate it to 95% of the speed of light;
how much energy will that take?
I can do that calculation.
The answer is, that it would take
the entire world's energy budget for one whole year.

So just economically, it's not going to happen.

But - what could happen is this.
Ark exterior
We could travel to the stars slowly,
in giant space ships or arks.
We could take hundreds of thousands of people
and travel to the nearest stars over thousands of years.
We take our plants with us,
Ark interior
our families, our air, entertainment, whatever we want..
We just … migrate, slowly.
That could happen one day.
And indeed it's just possible that some neighboring
civilization has already set off on its migration.
When the aliens arrive it won't be in little speedboats.
They will arrive by the millions in giant arks.

Well.. sending bodies is hard;
sending signals is much easier.
The first TV transmissions that leaked out of Earth are
just about now reaching the star Aldebaran.
What the inhabitants of Aldebaran
make of 'I Love Lucy' we may never know.
Suppose they're signaling back to us?
The SETI project is looking.
Some of our radio telescopes are scanning the sky,
looking for signals.
So far … nothing;
but we keep watching.. and we wait.

SETI telescopes

=====ETERNITY===

drone change

We wait … and we wait … but our lives are so short.

All things must pass.

HDF

Viewed against the limitless backcloth of eternity,
surely our lives are just a single tick of the cosmic clock?
Well… not really.
We actually sit somewhere in the middle range of things.
Let's go back to our old friend the Sun.
The Sun will burn for ten billion years.

Sun

That's roughly a hundred million human lives.

At the opposite end of the scale,

GRB

what about a gamma-ray burst?
These are incredibly powerful events,
which we can see all the way across the Universe -
but they last only a few tens of seconds.
You could fit a hundred million bursts inside one human life.

Not all stars are the same.
The small ones, the red ones, burn for a long time.
They can last trillions of years.
The big stars, the blue ones, burn much hotter and faster.

Pleiades

The biggest stars will last only ten million years.
Now you may say, well, ten million years?
That sounds like a long time to me!
But it's not really long in cosmic terms.

Think of it like this.
Go out on a dark night and you will easily find
the tight cluster of stars in Taurus
that we call the Seven Sisters - the Pleiades.

Now imagine yourself being Stegosaurus,
one hundred and fifty million years ago,
staring at the same piece of sky.
The Seven Sisters are not there.
They've not yet been born.
Meanwhile, elsewhere on the sky,
Stegosaurus can see other bright blue stars
that have long since vanished.
The sky does change.

We talk of birth and death
but really the story is of transformation.

Look across at Orion's sword,
where we find a cloud of gas - the Orion Nebula -
where new stars are condensing.
In the Pleiades,
the fresh-born stars are burning bright in the prime of their life.
A middle sized star like the Sun,
as it ends its life will puff up
and shed material out into space.
Those atoms will recollect, condense, and make new stars.

Orion

Pleiades

Helix

Orion

And so the cycle continues.

Will that cycle go on forever?
Maybe not.

One of the great twentieth century discoveries
was that the galaxies are moving apart.
The Universe is expanding.
Imagine running the movie backwards.
You can see that at a finite time in the past
- a long time ago, but at a finite time in the past-
everything was in the same place,
and the Universe exploded out of that point.

Expansion movie

The Big Bang.

Big Bang movie

The galaxies are pulling on each other with their gravity.
Will that slow down the expansion, bring it to a halt,
and make everything fall back together?
Many astronomers including myself,
spent decades trying to answer that question;
but today we know that in fact the expansion is getting *faster*;
it's accelerating.

Expansion movie

We don't know why;
it's one of the great puzzles of modern science;
but it is a fact;
the galaxies are rushing ever further and faster apart.

Does that mean we are heading for a sparse cold future?
Perhaps.
But here we are at the hairy edge of knowledge….

===MEANING====

mini interlude violins

HDF

So now our heads are spinning, trying to take this all in.

As human beings we're desperate to find meaning;
do we find meaning in the stars?

Earth from Mars

Most of space is just empty.
Seen from Mars the Earth is just a dot in the sky,
lost in the inky blackness of space.

Starfield

If we look out into the Milky Way,
in most directions we see nothing but stars.
They just seem to be littering away into the distance,
more and more stars.
In some moods,
the seeming randomness of endless stars receding into the distance
can bring on a feeling of emptiness and desolation.
You look at all those stars,
and you think …
there are no clues here….

Ring Nebula

And then as we turn our gaze …
here is a beautiful nebula…
The Ring Nebula in Lyra; the Horsehead Nebula;
the Helix; the Cats Eye and the Red Rectangle.

We stare in wonder at its beauty.
Then suddenly… it seems puzzling.
You think - this thing out there in space,
why do I resonate with this? Why?
Is that not a coincidence?

Hawking+CMB

Some years ago,
Stephen Hawking said that looking at the Cosmic Microwave background -
that's the light from the ancient universe which is just reaching us today -
he said that looking at the Cosmic Microwave background
is like looking at the Face of God.

twinkle

Now, he was teasing, because he is an atheist.
But he was trying to get at *something* deep.
If there is a profound thought
which strikes almost every scientist
as they look at pictures of the universe,
it's this:

HDF

behind all the beauty,
behind all the pictures,
there's numbers.

zoom to numbers

The universe may be made of atoms,
but it works by numbers.

===OUTRO====

drone change

So at the end of this long journey, we run out of words.

Perhaps all we can do is stare in wonder

HDF

face

Hiroshige

- at the Universe out there
- at life in the sun
- at our own human creations.

And with our understanding

Virgo movie

- with our imagination
- with a little bit of computer trickery,

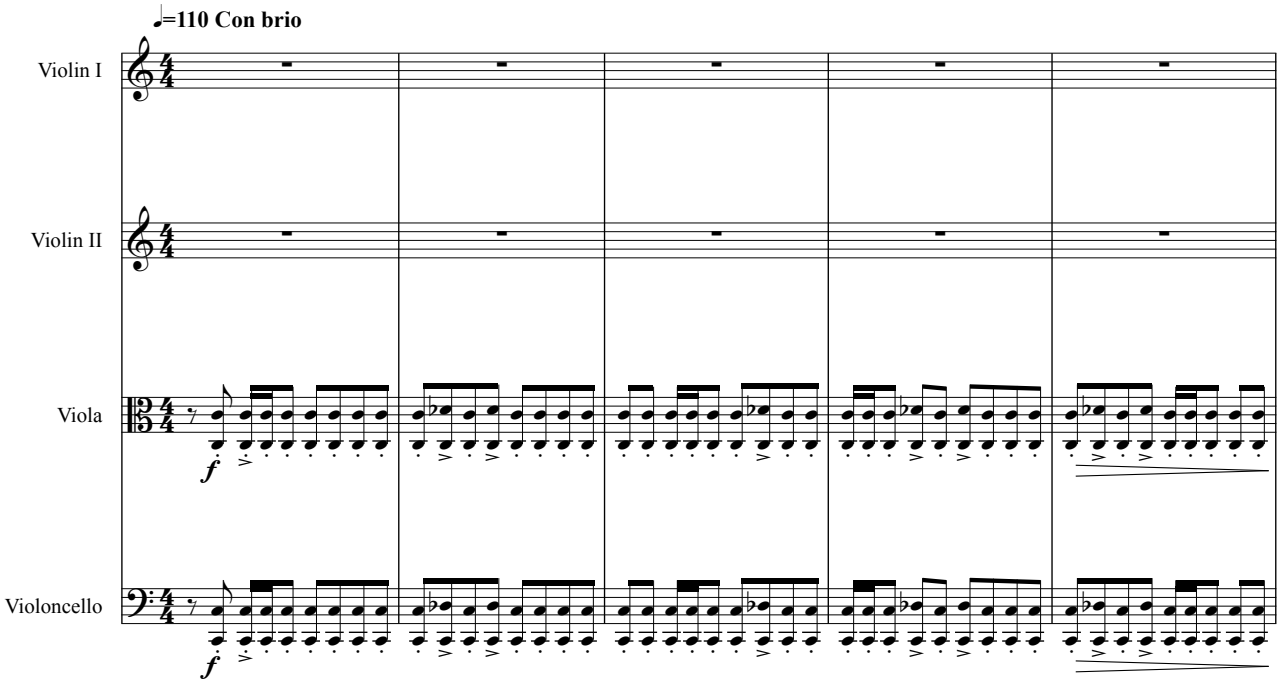
we can put all these things together in our heads.

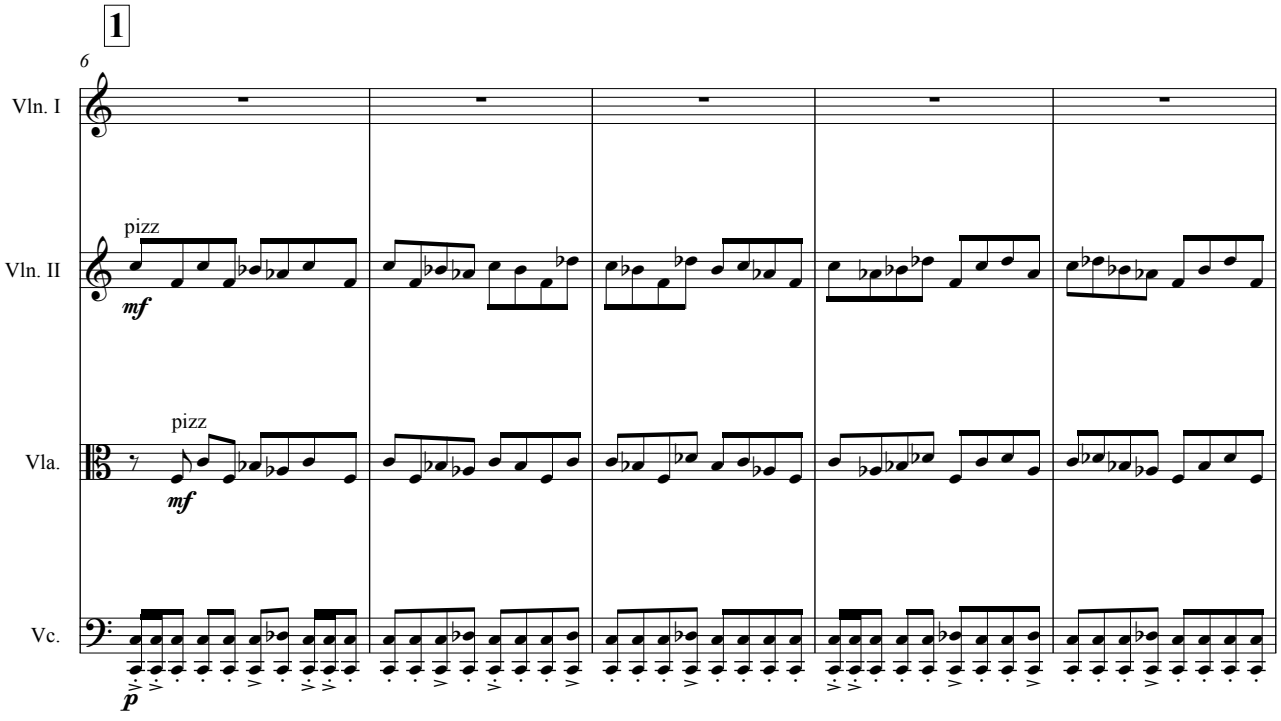
titles

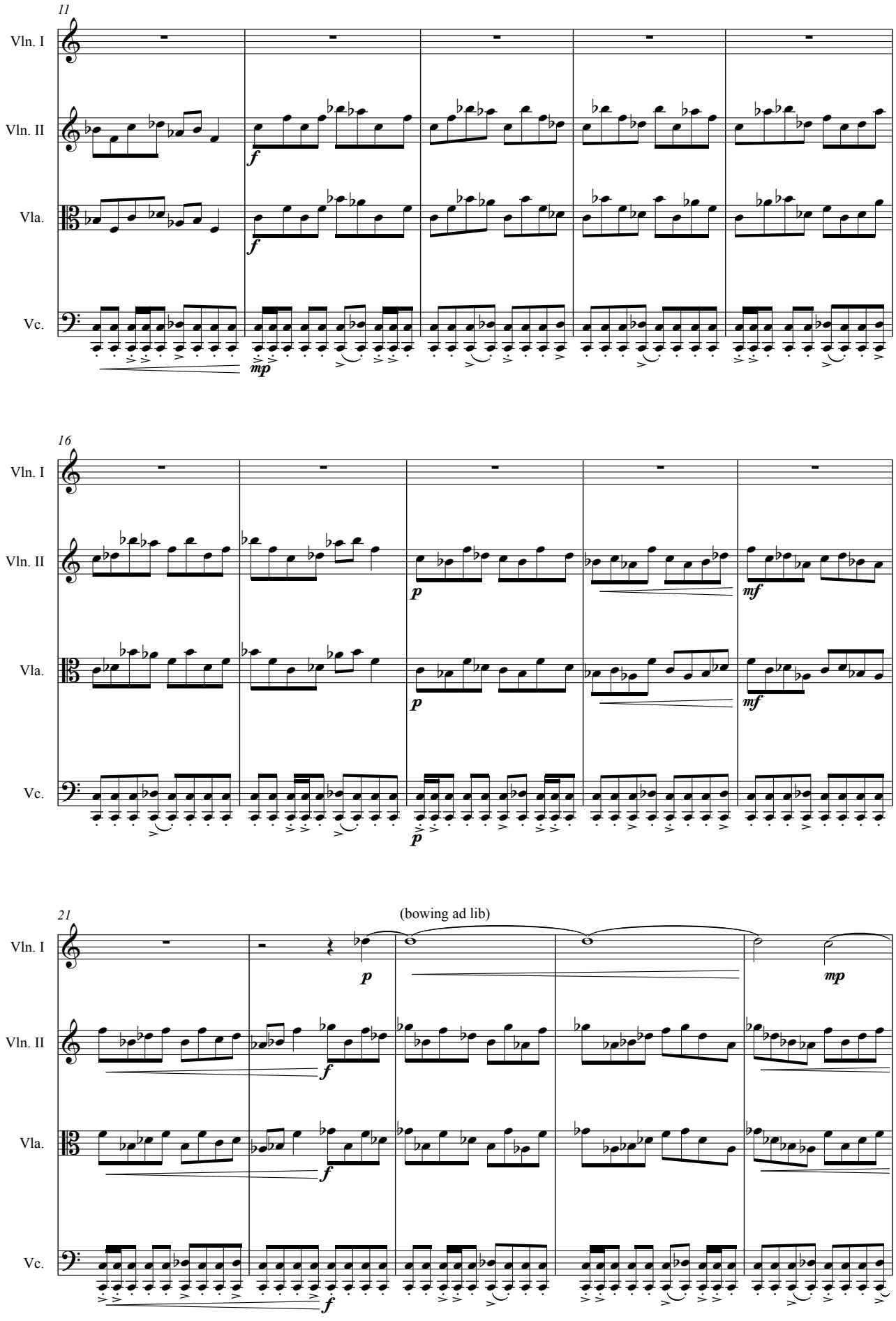
Music for Lost in Space

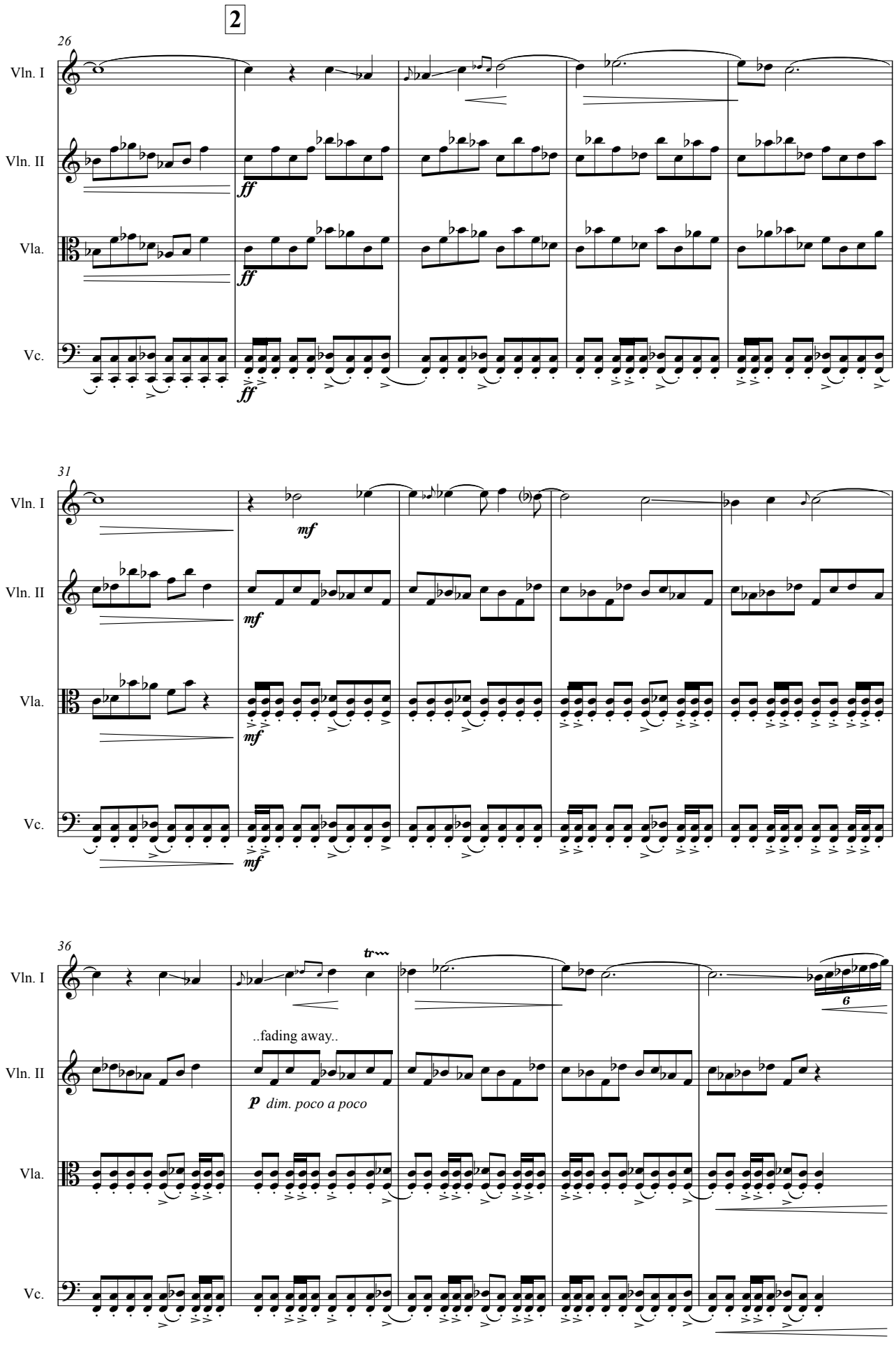
Score

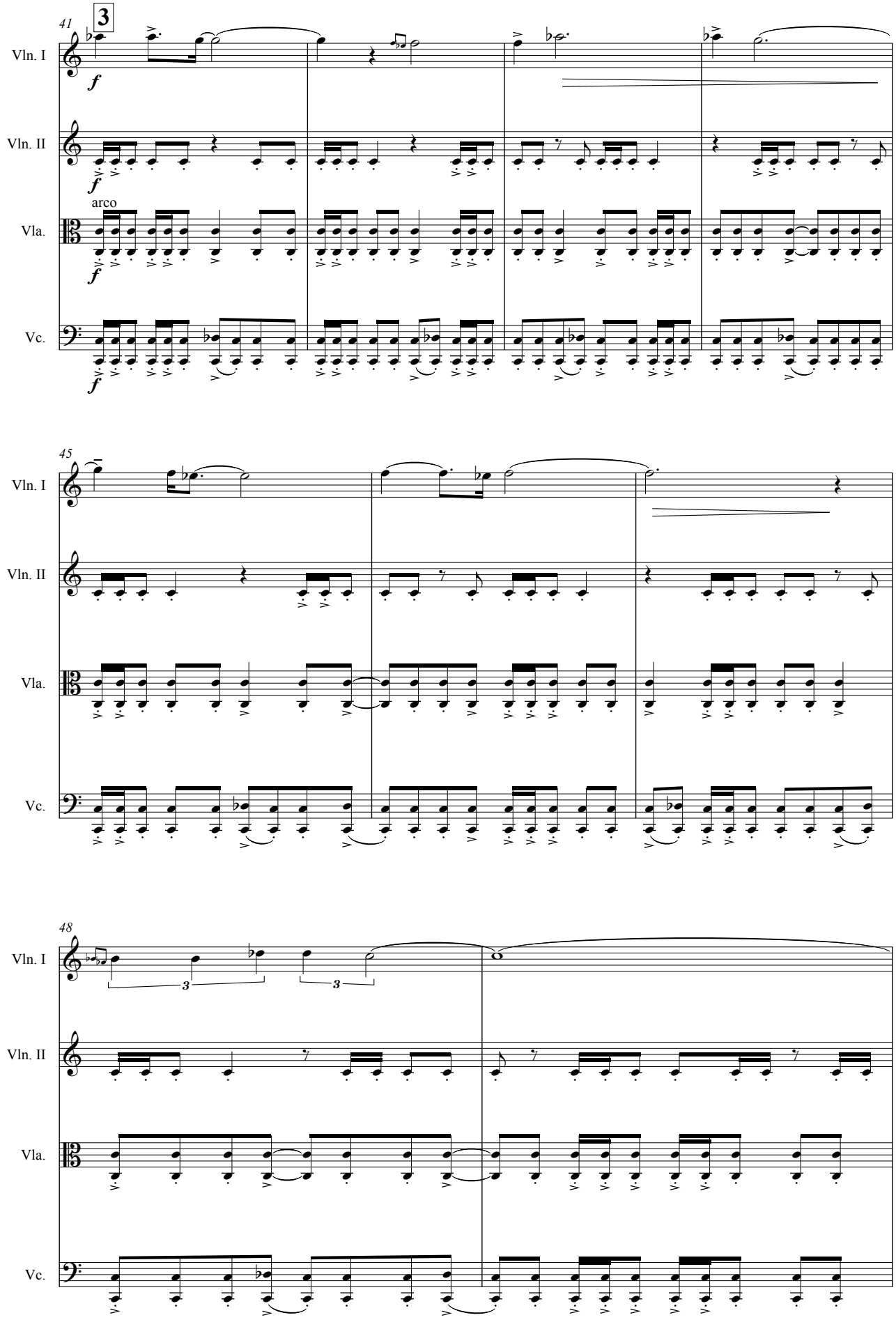
Strings 1

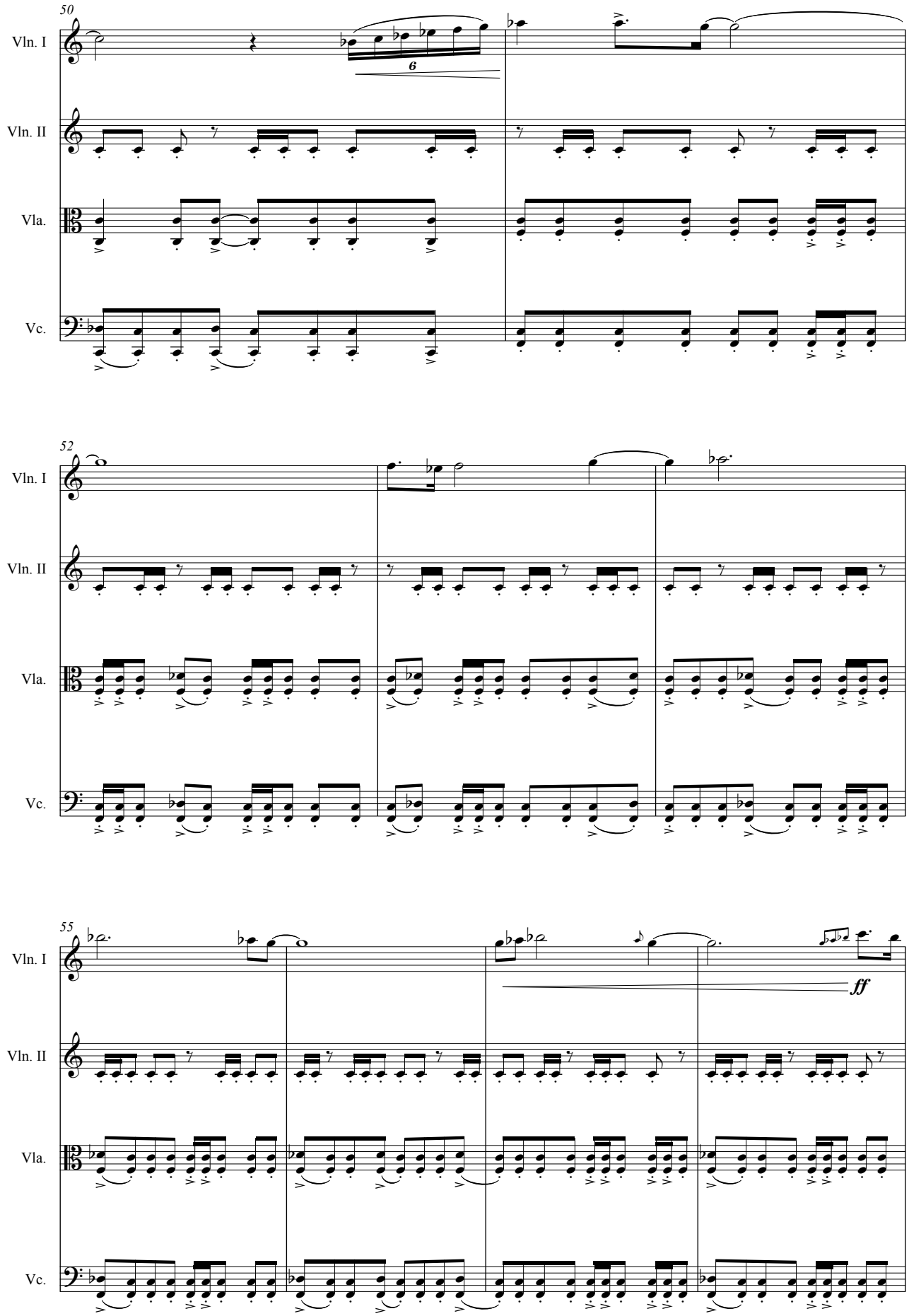

♩=110 Con brio
Violin I
Violin II
Viola
Violoncello
f
f

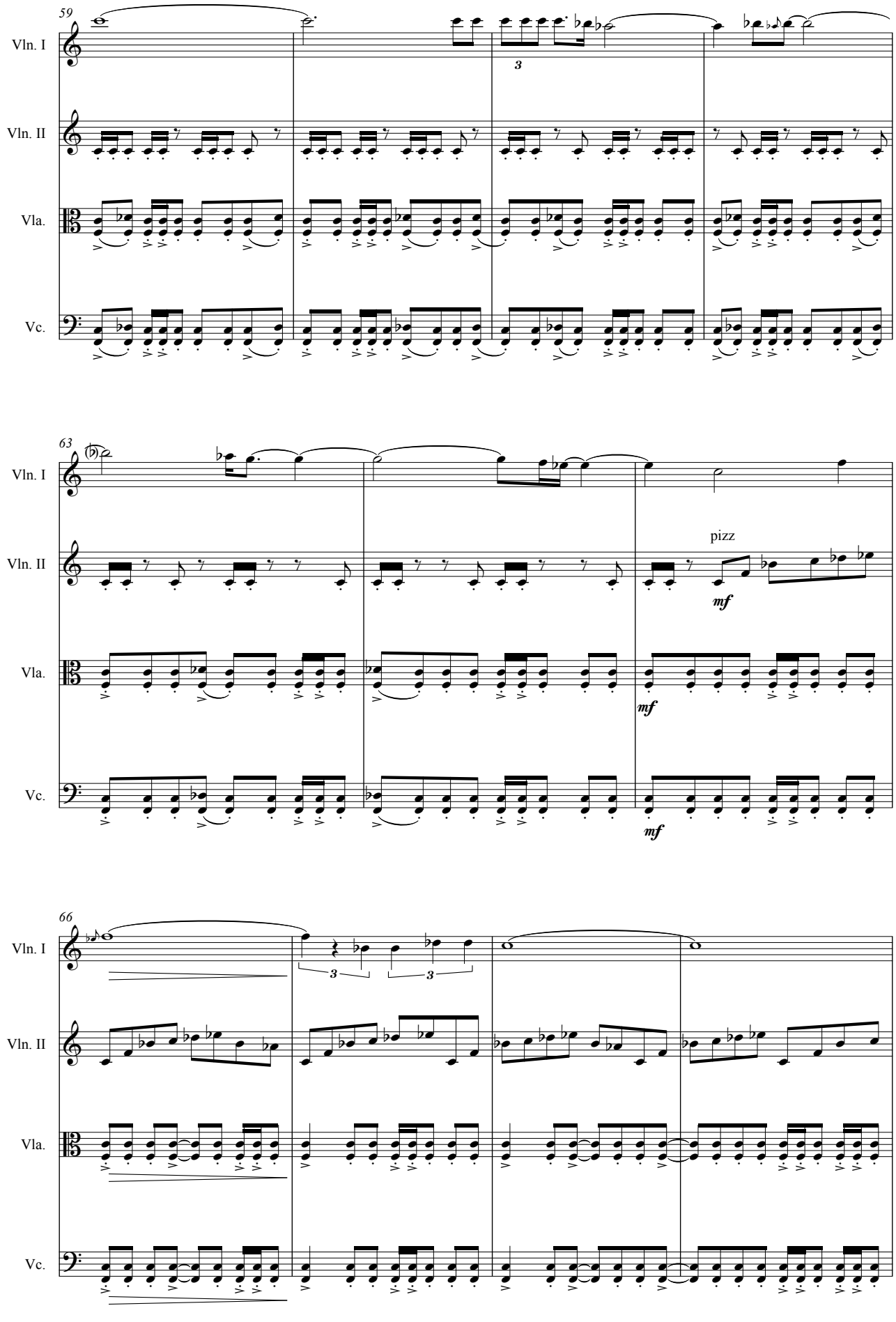

1
6
Vln. I
Vln. II
pizz
mf
Vla.
pizz
mf
Vc.
p

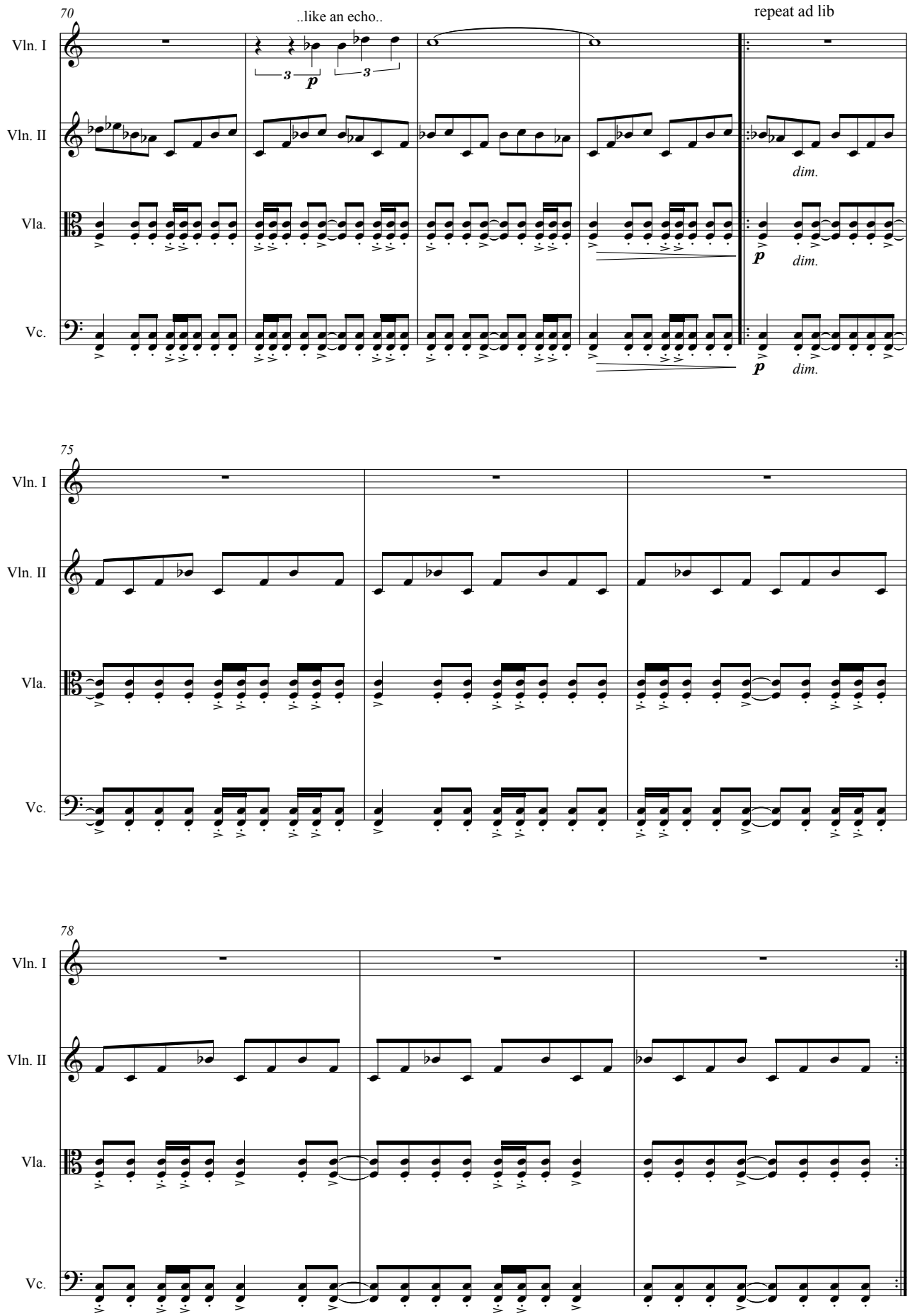

11
Vln. I
Vln. II
Vla.
Vc.
f
f
mp
16
Vln. I
Vln. II
Vla.
Vc.
p
p
p
mf
mf
21
(bowing ad lib)
Vln. I
Vln. II
Vla.
Vc.
p
mp
f
f
f


2
26
Vln. I
Vln. II
Vla.
Vc.
ff
31
mf
36
tr
..fading away..
p dim. poco a poco
6

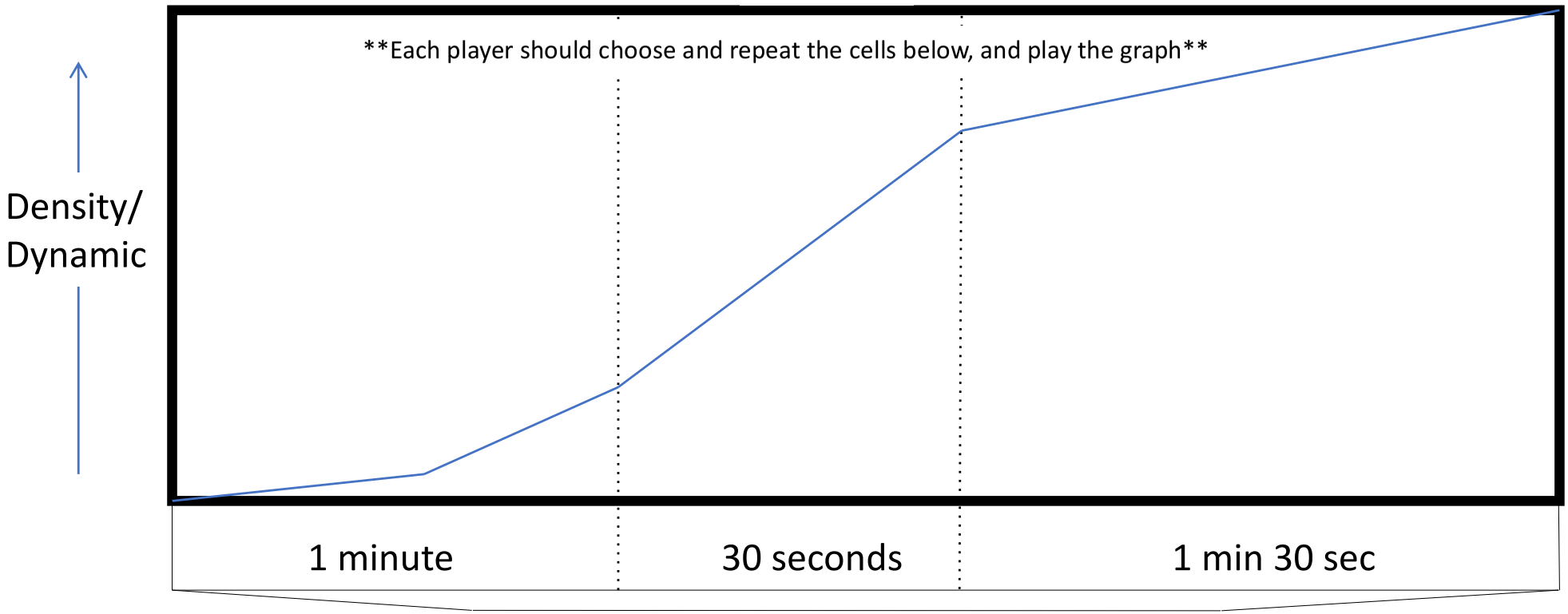

41
3
Vln. I
Vln. II
Vla.
arco
Vc.
f
45
48

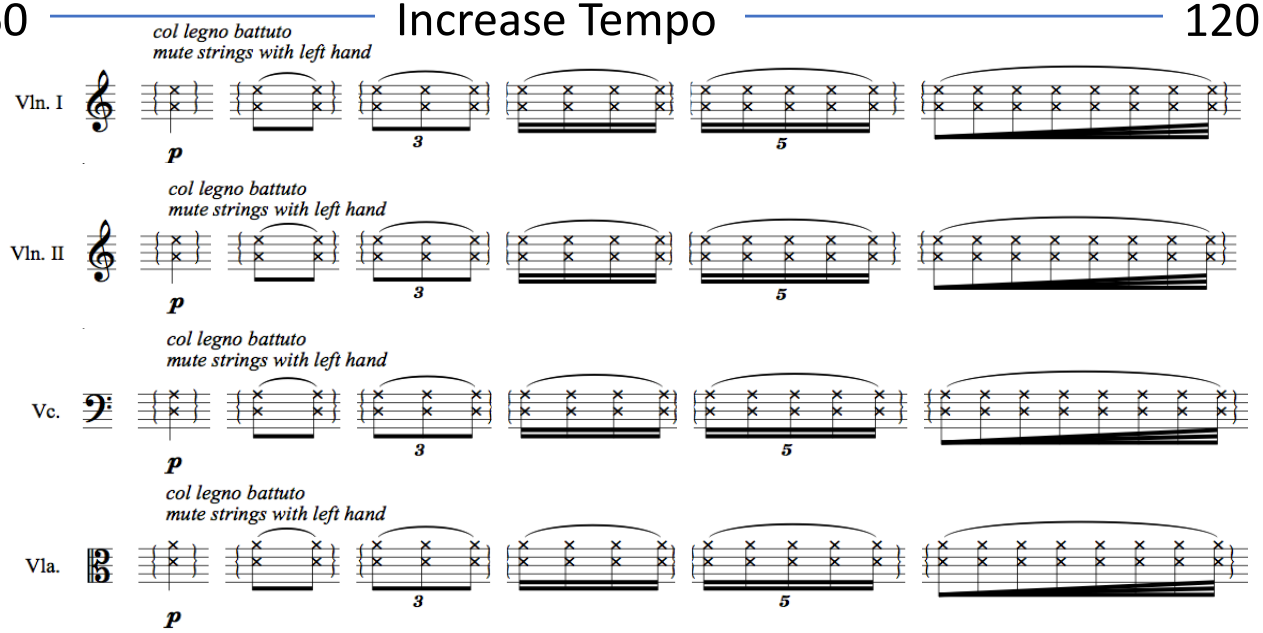

50
Vln. I
Vln. II
Vla.
Vc.
6
52
Vln. I
Vln. II
Vla.
Vc.
55
Vln. I
Vln. II
Vla.
Vc.
ff


59
Vln. I
Vln. II
Vla.
Vc.
3
63
pizz
mf
66

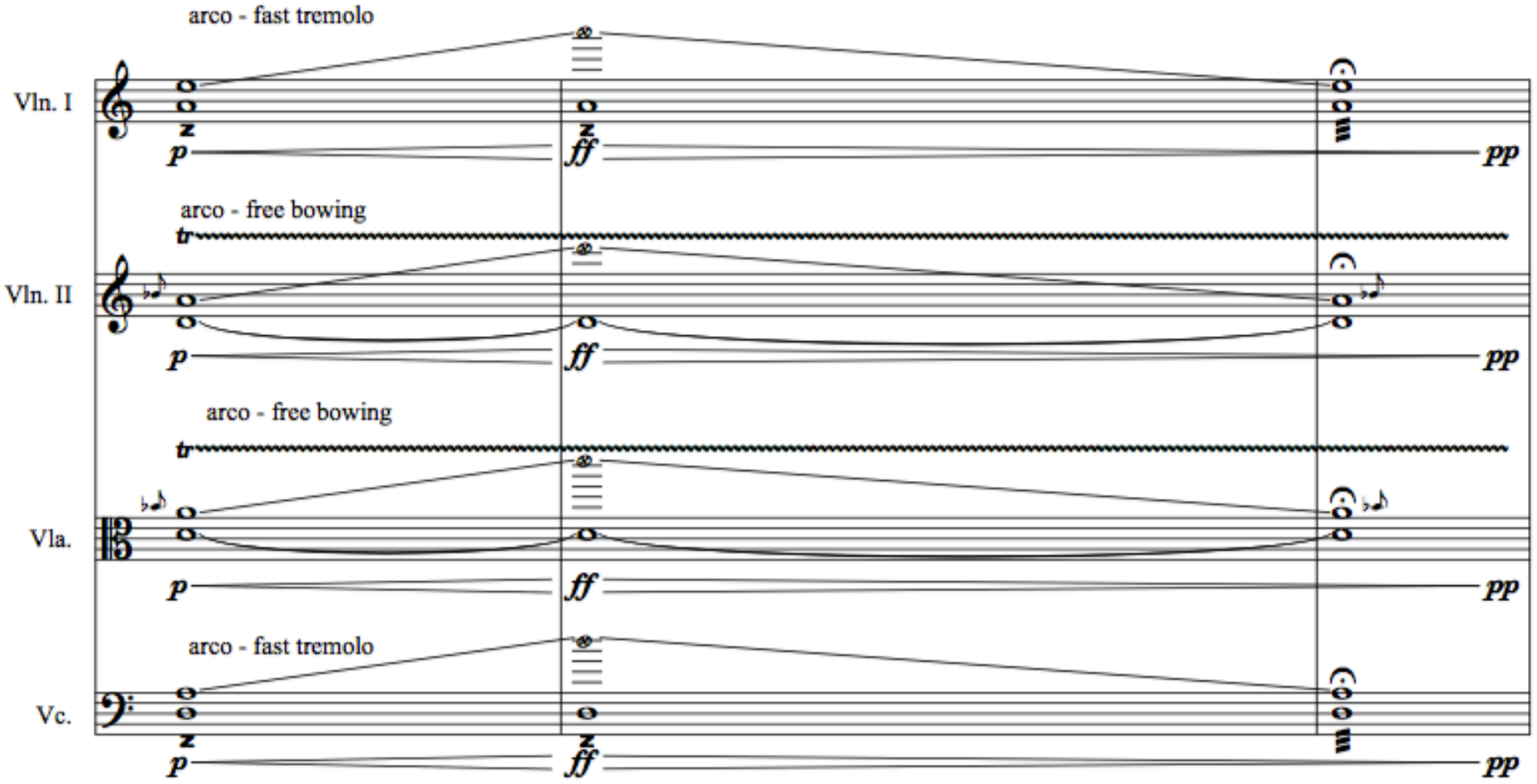

70
..like an echo..
repeat ad lib
Vln. I
Vln. II
Vla.
Vc.
3
3
p
dim.
p
dim.
p
dim.
75
Vln. I
Vln. II
Vla.
Vc.
78
Vln. I
Vln. II
Vla.
Vc.

Strings 3

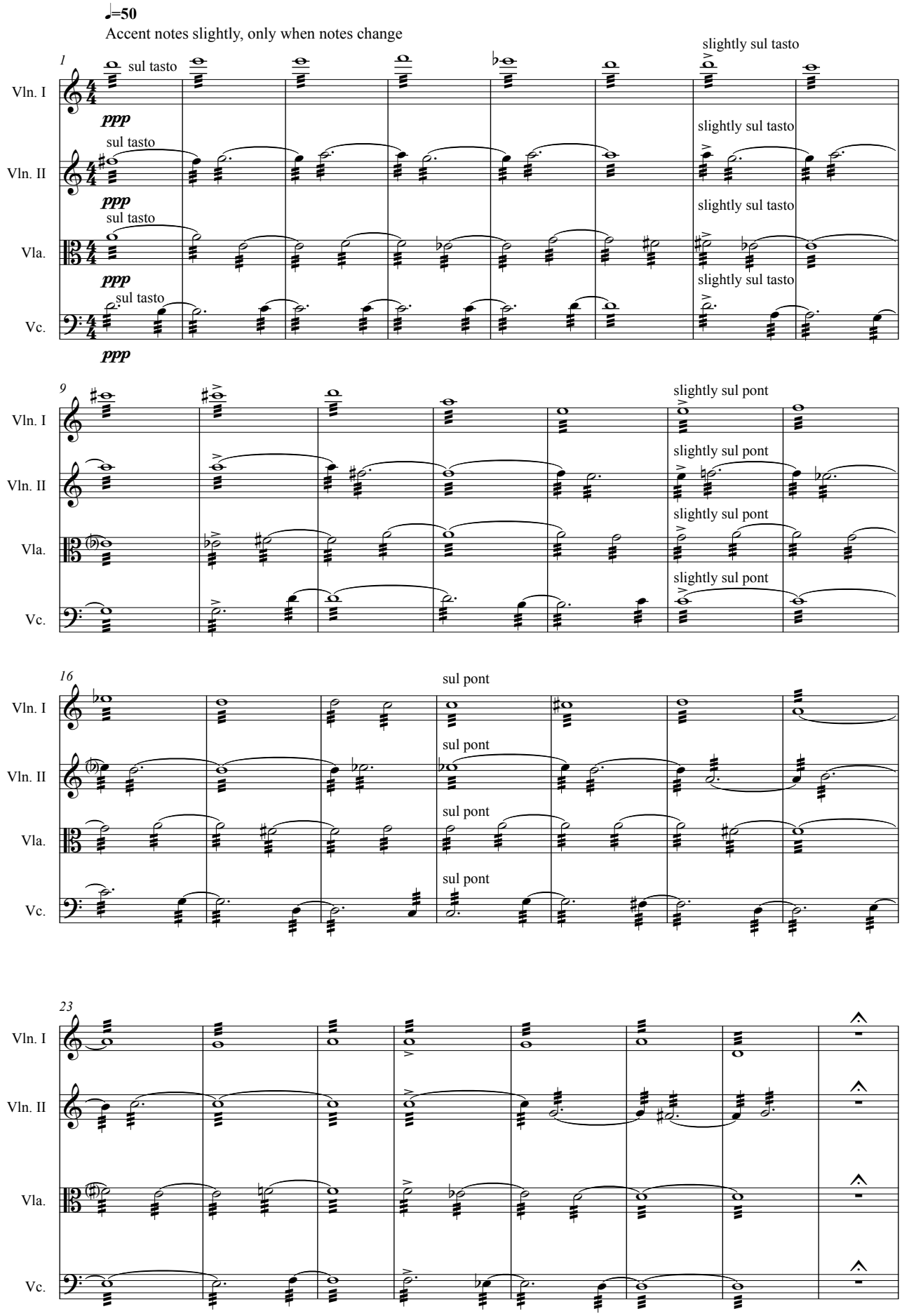

Each player should choose and repeat the cells below, and play the graph
Density/
Dynamic
1 minute
30 seconds
1 min 30 sec
60
Increase Tempo
120


col legno battuto
mute strings with left hand
Vln. I
p
col legno battuto
mute strings with left hand
Vln. II
p
col legno battuto
mute strings with left hand
Vc.
p
col legno battuto
mute strings with left hand
Vla.
p

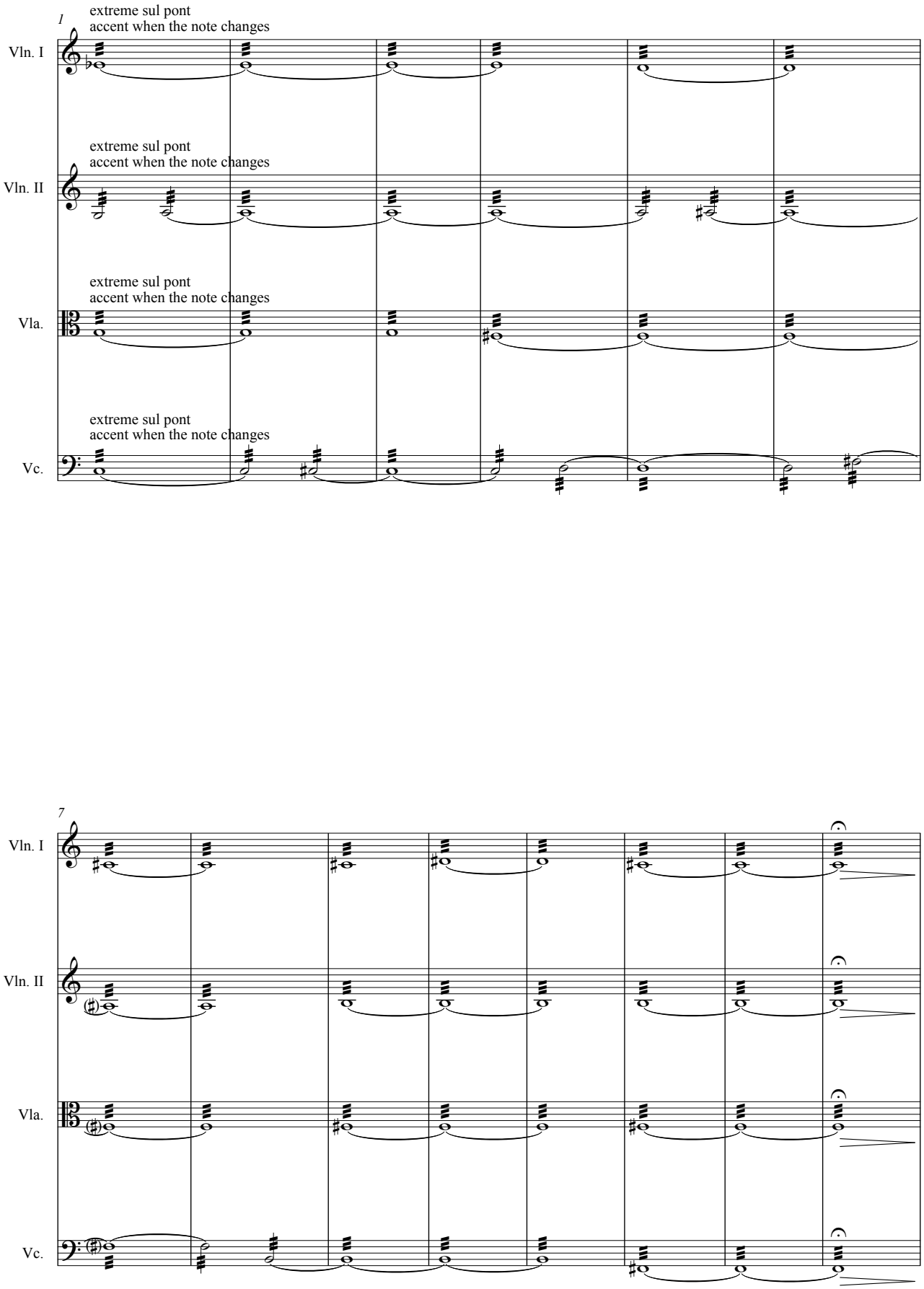
Strings 4



6 seconds — 12 seconds — ~6 seconds


♩=50
Accent notes slightly, only when notes change
1
Vln. I
Vln. II
Vla.
Vc.
sul tasto
ppp
slightly sul tasto
9
slightly sul pont
16
sul pont
23

Strings 6


1
extreme sul pont
accent when the note changes
Vln. I
extreme sul pont
accent when the note changes
Vln. II
extreme sul pont
accent when the note changes
Vla.
extreme sul pont
accent when the note changes
Vc.
7
Vln. I
Vln. II
Vla.
Vc.

Strings 7

Nod to signal all cues

1

~30”

Violin I

Cue1

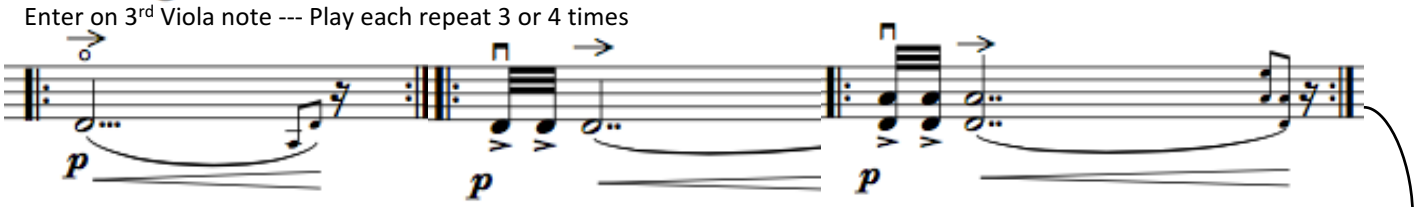
Everyone should play as an individual.
Not synchronized.
Sparingly at first, play up to 5 grace notes, adding more as time goes on
(ad lib/ as notated)

→ = Hold note for the length of an entire bow.
Play as slowly as possible while sill sounding
Use the bow as a guide for the tempo

In general, follow the dynamics of the violin solo

Violin 2:

Enter on 3rd Viola note --- Play each repeat 3 or 4 times



Begin to alternate between the measures, in any order
Repeat until cue 2

Viola:

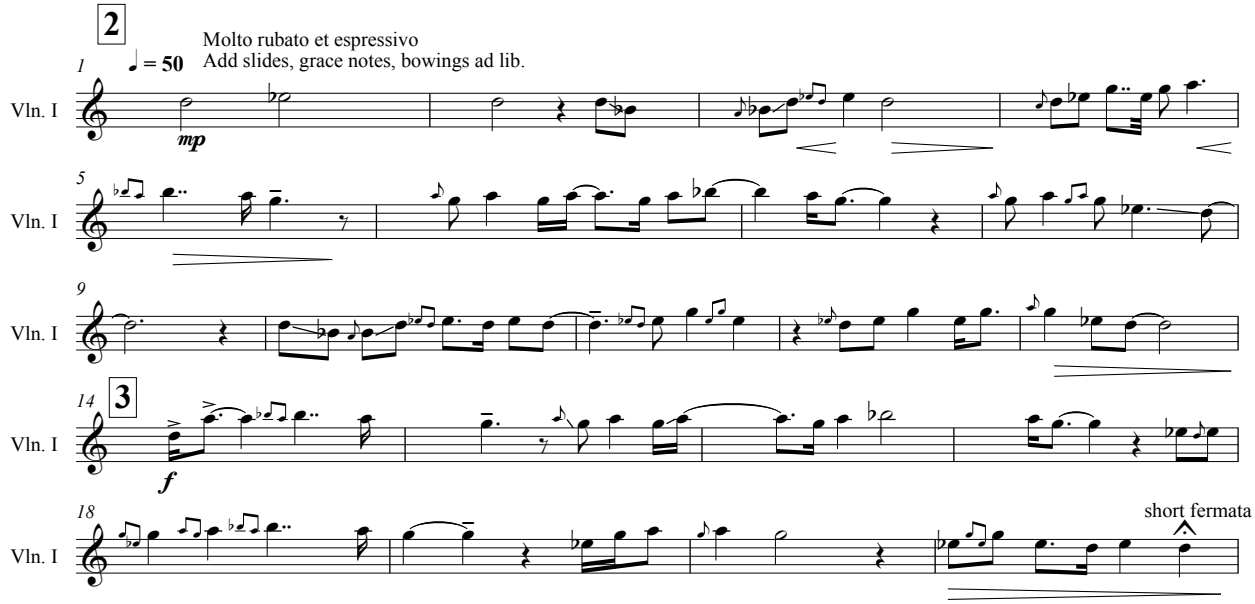
Enter on 3rd Cello note --- Play each repeat 3 or 4 times

Begin to alternate between the measures, in any order
Repeat until cue 2

Cello:

Play each repeat 3 or 4 times

Begin to alternate between the measures, in any order
Repeat until cue 2

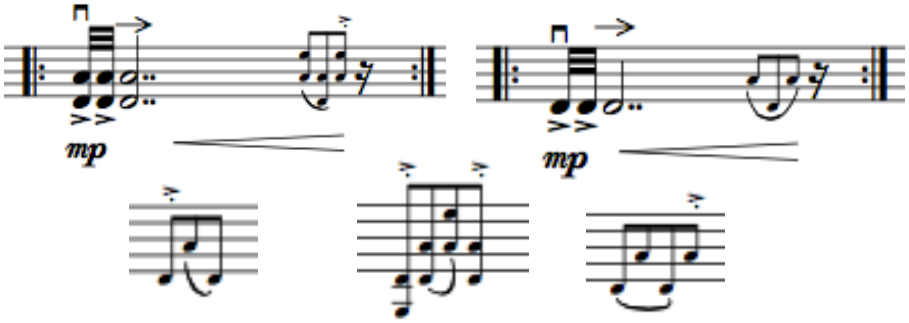


Cue2

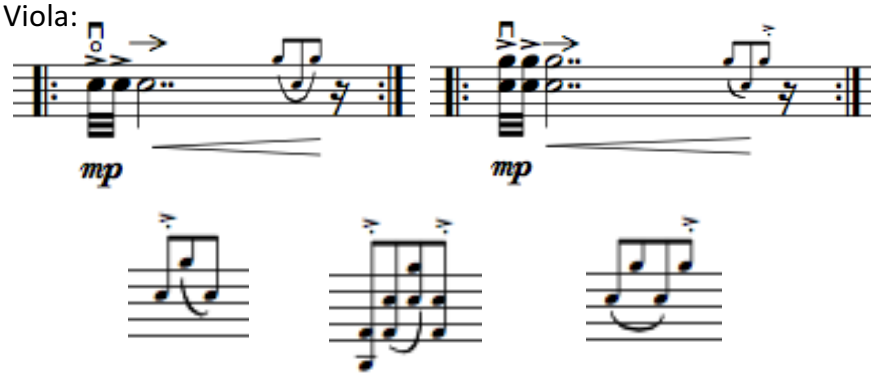
Continue repeating the phrases from the Cue 1.

Start quickening the long notes, playing grace notes on a separate bow. Begin to separate the grace notes ad lib (as below) – never more than 5.

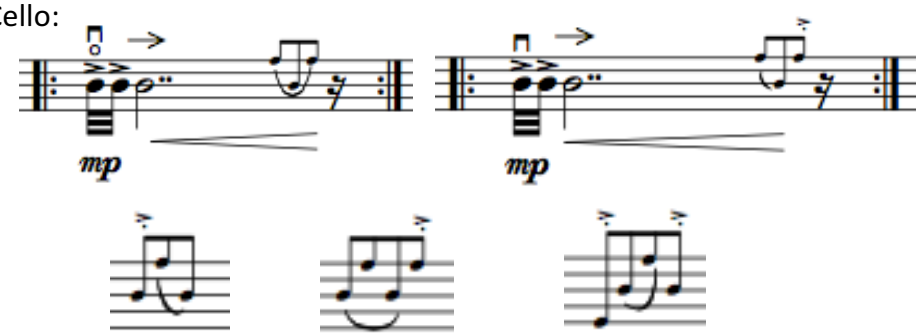
Violin 2:



Viola:

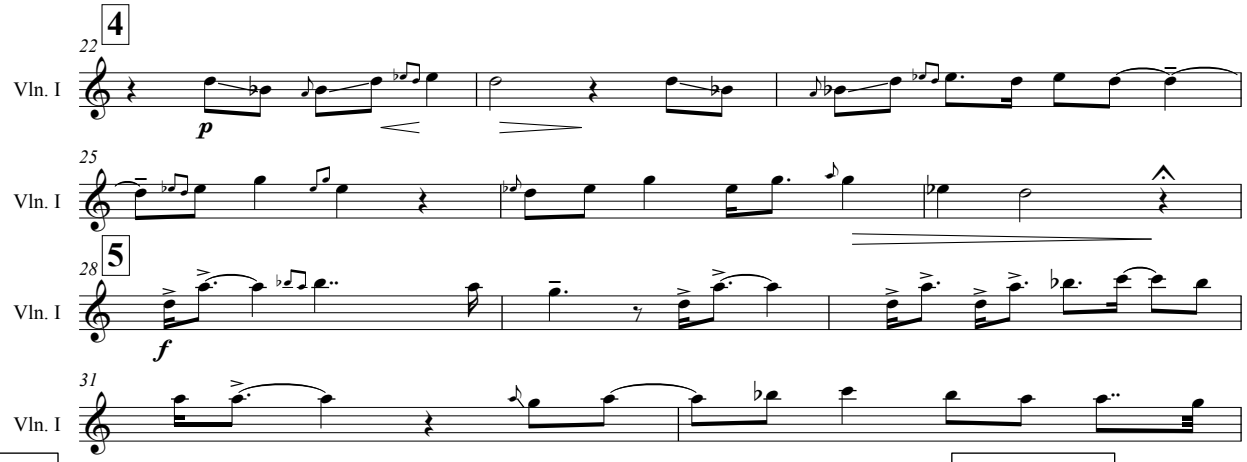


Cello:



Cue3

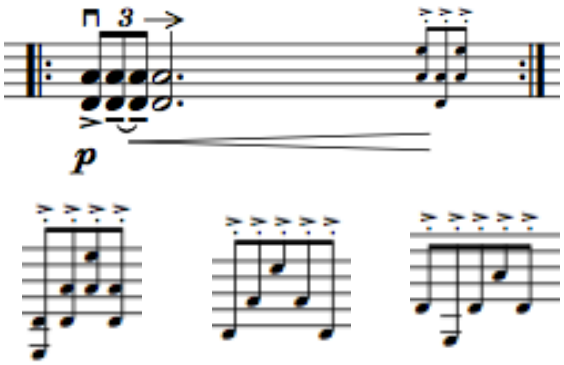
Continue phrases from Cues 1 & 2
Start notes loudly and get quiet



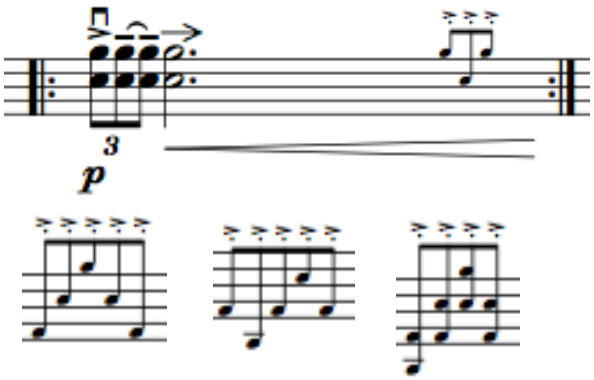
Cue4

Poco sul pont - more overtones, strained.
The grace notes are all separate now
Only play this phrase below -Grace notes still ad lib

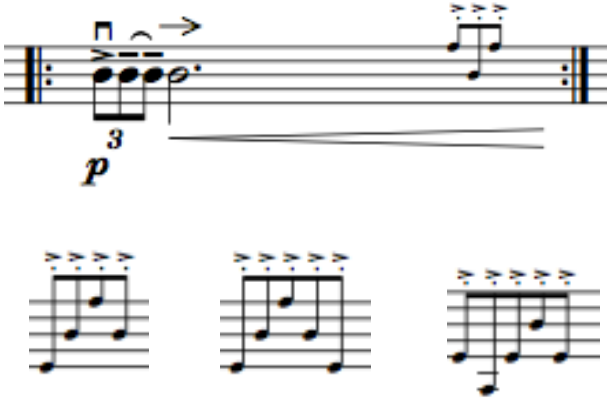
Violin 2:



Viola:

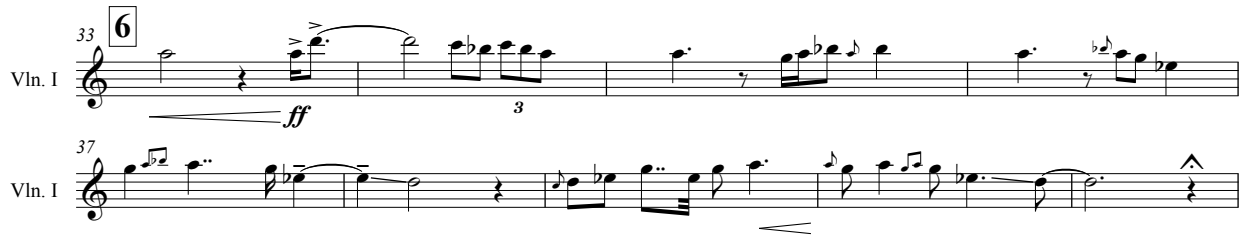


Cello:



Cue5

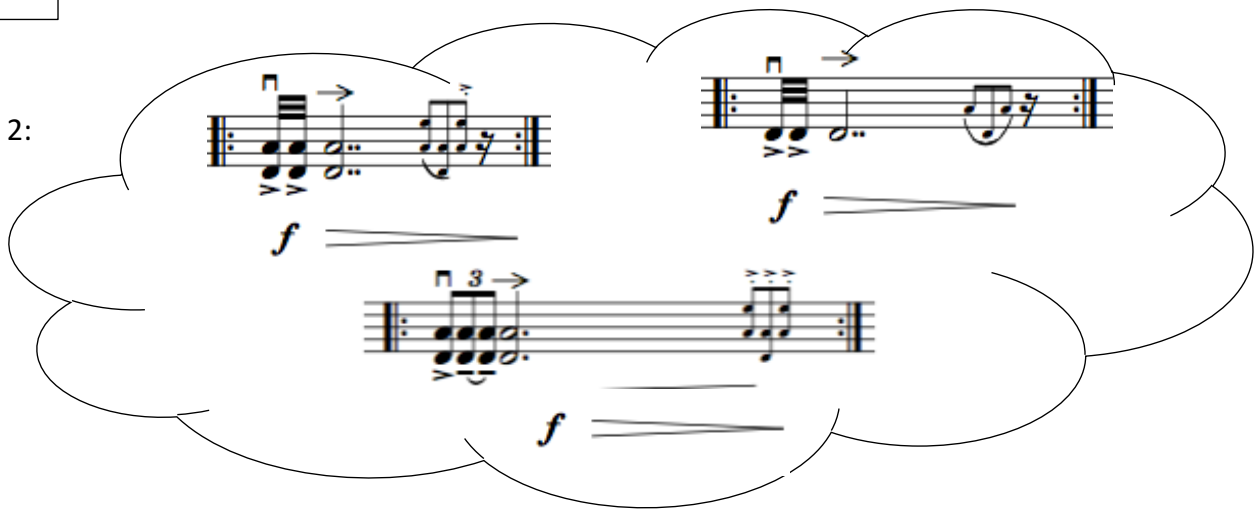
Continue phrases from cue 4–
Start notes loudly and get quiet
Sul pont



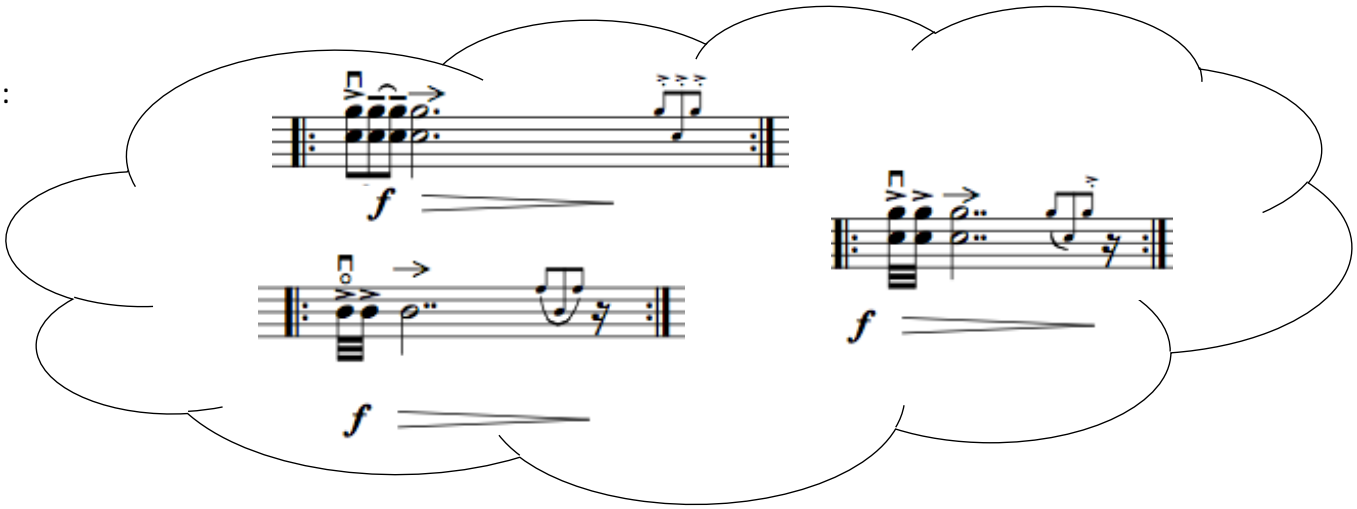
Cue6

Even louder - Start slurring grace notes again

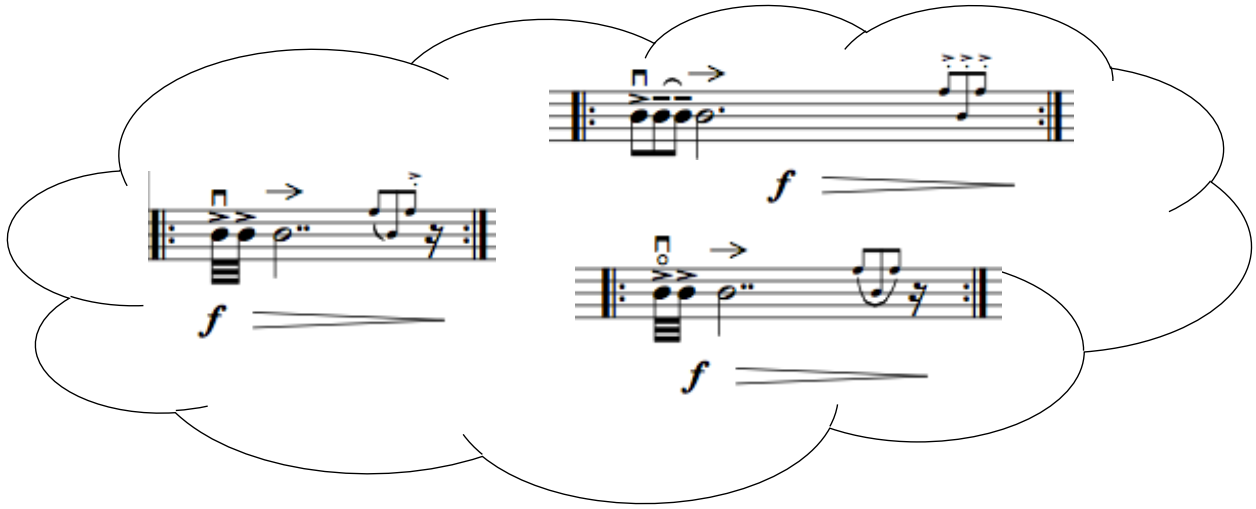
Violin 2:

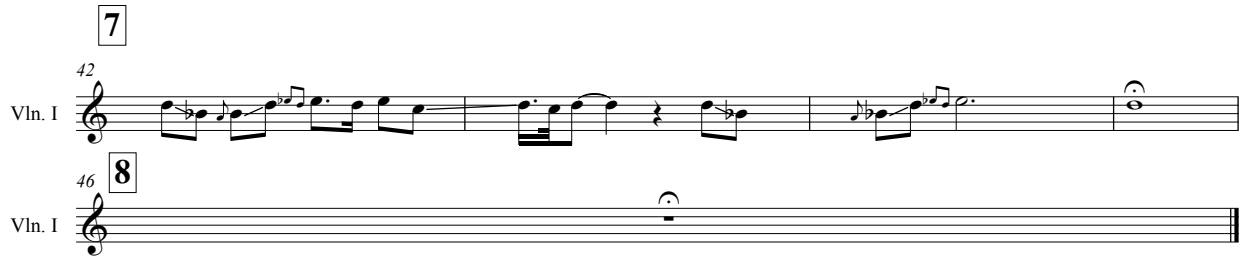


Viola:



Cello:

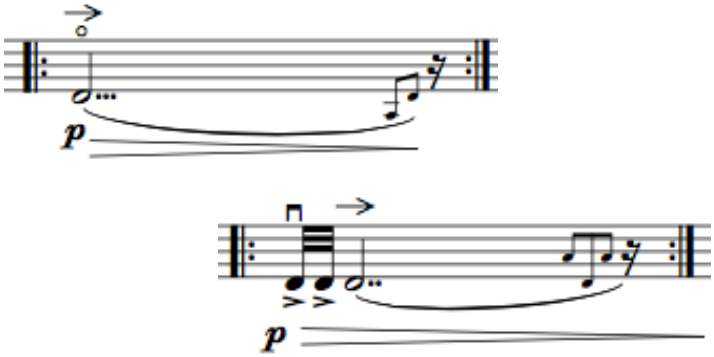




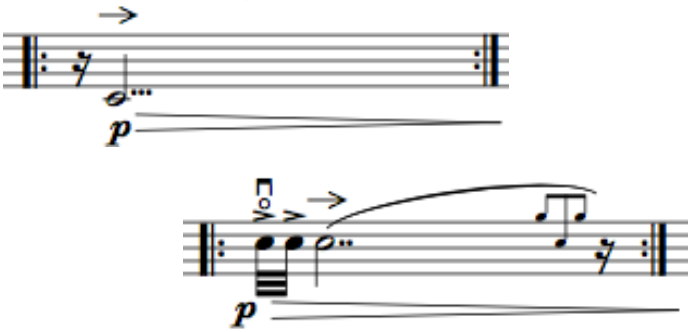
Cue7 → Cue8

Quiet -Slur all grace notes

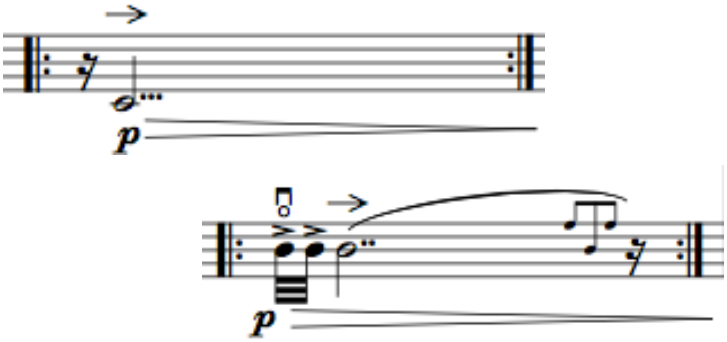
Violin 2:

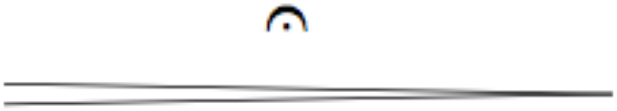


Viola:



Cello:





Keep repeating for ~1 minute

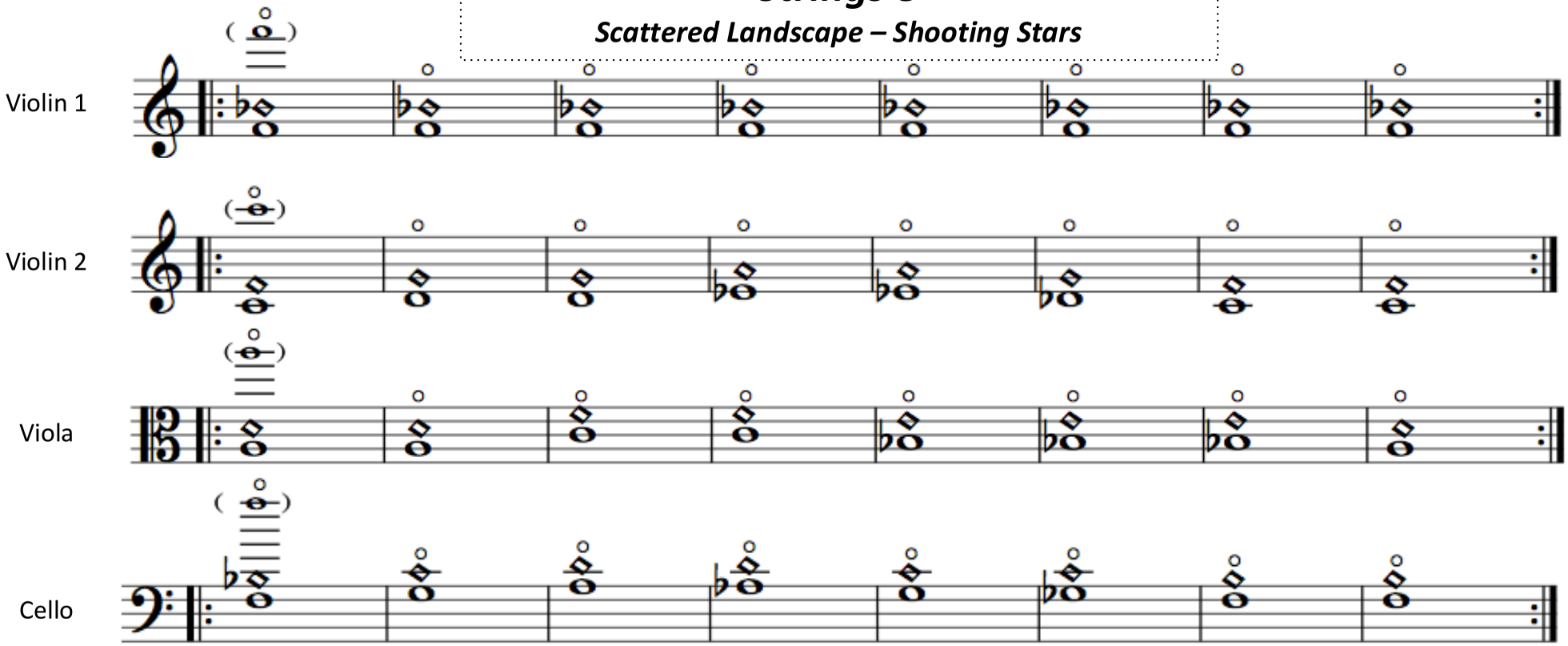
Feel free to use any material from the entire section

All slurred, under one bow

Getting quieter and less intense

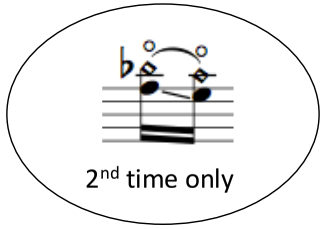
Strings 8

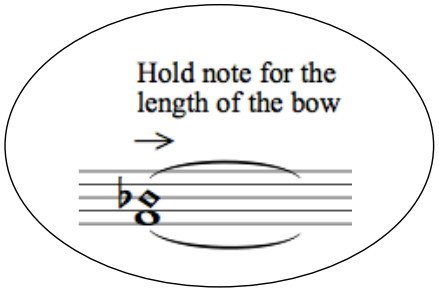
Scattered Landscape – Shooting Stars

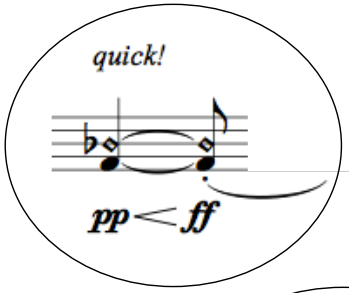


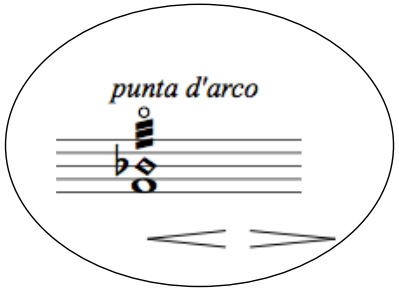
Play the chorale above using the gestures below
There should be multiple gestures per note
Approximately 25 seconds per note of the chorale, repeating once (6-7 min total).
Every so often, play the octave above the note written, increasing this over time.
Please vary the note lengths, and leave space for silence (at times). Everyone has the same gestures, and should work together to create a dreamlike mesh of sound

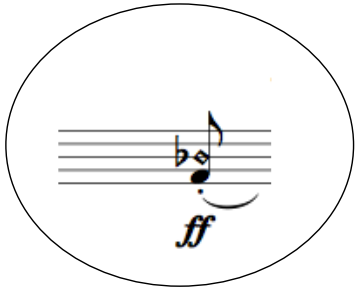
Gestures:

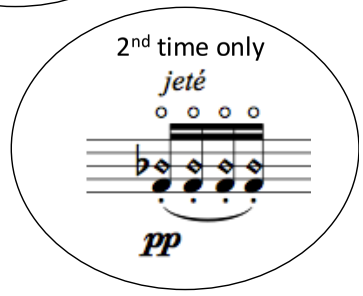


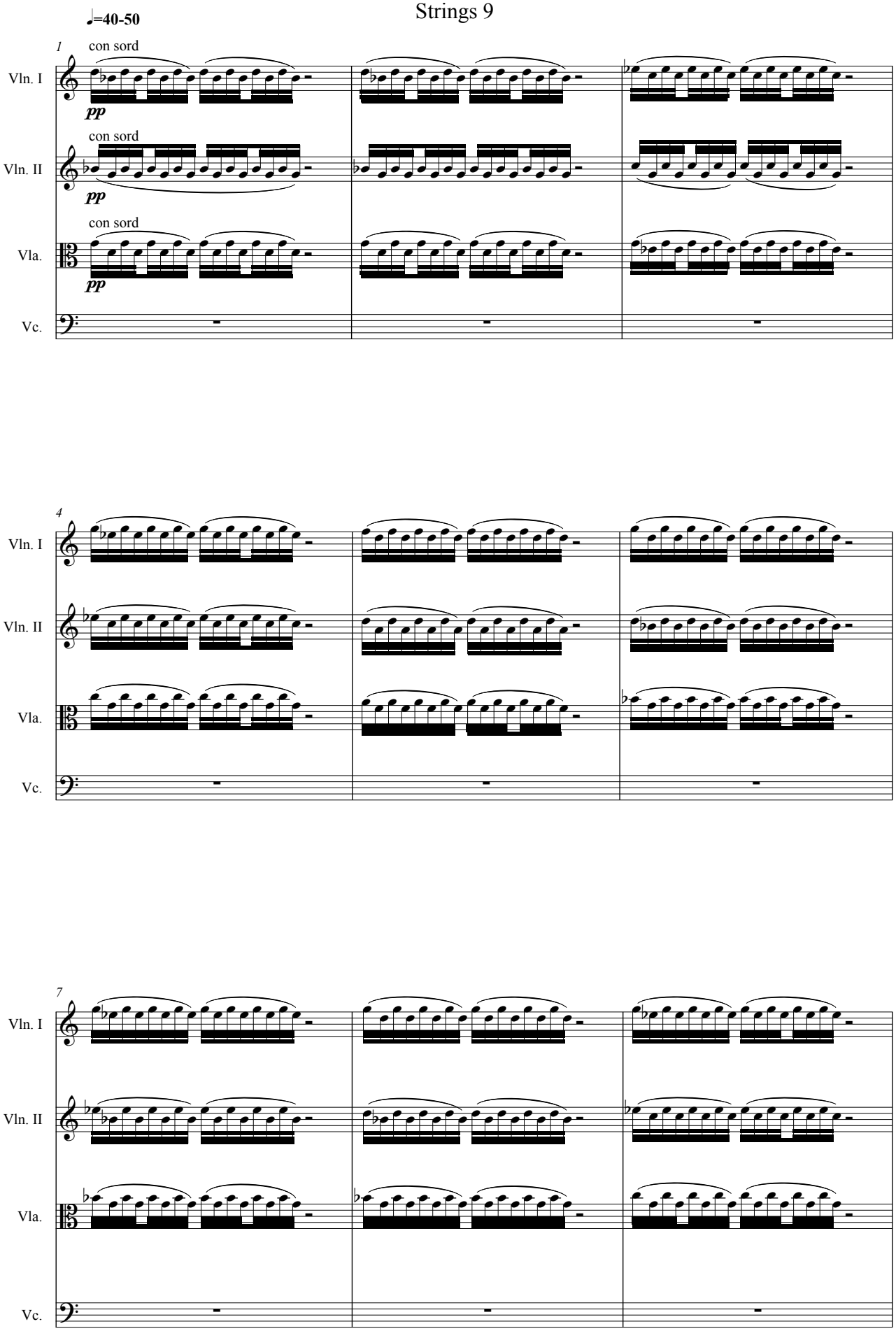


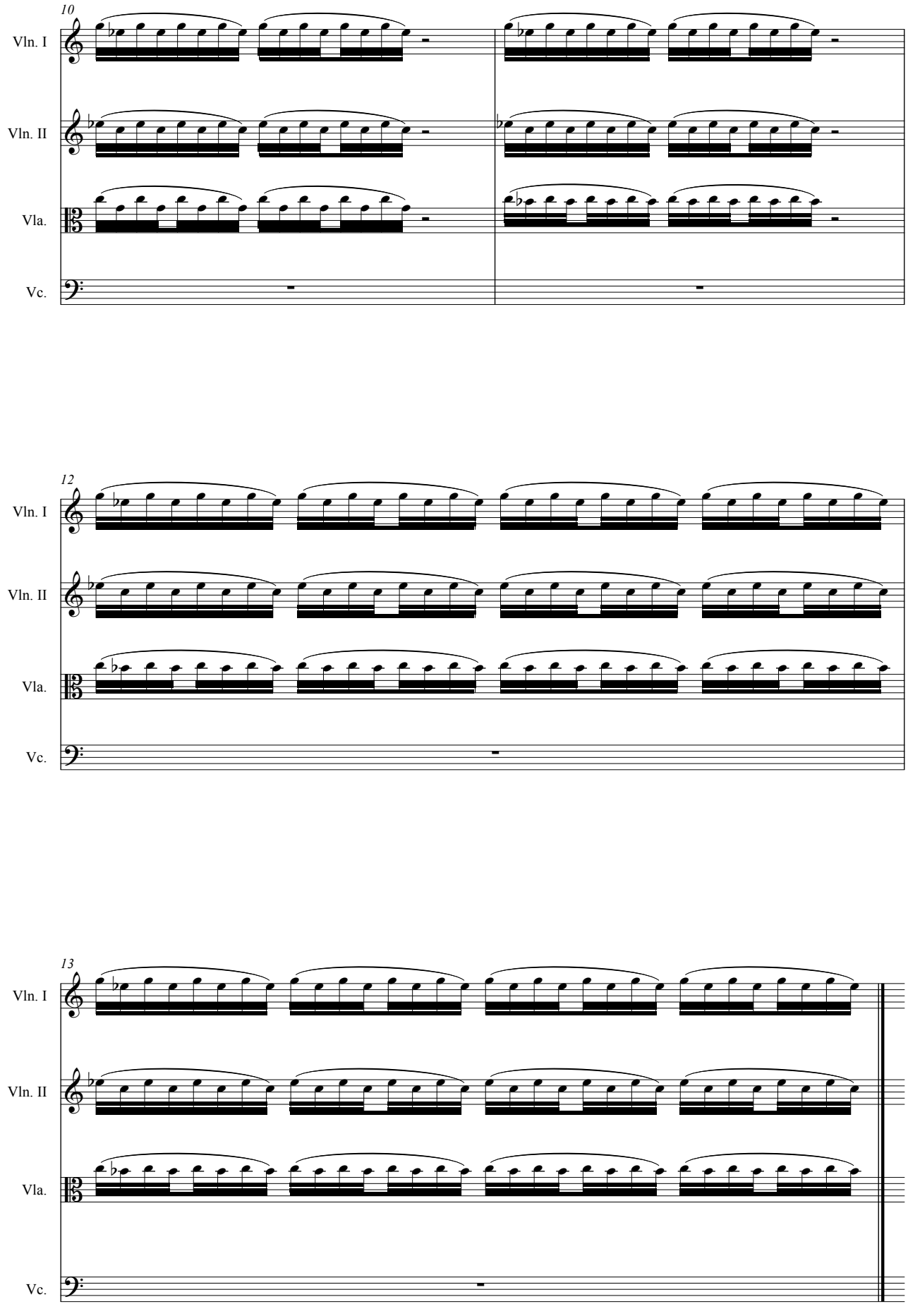


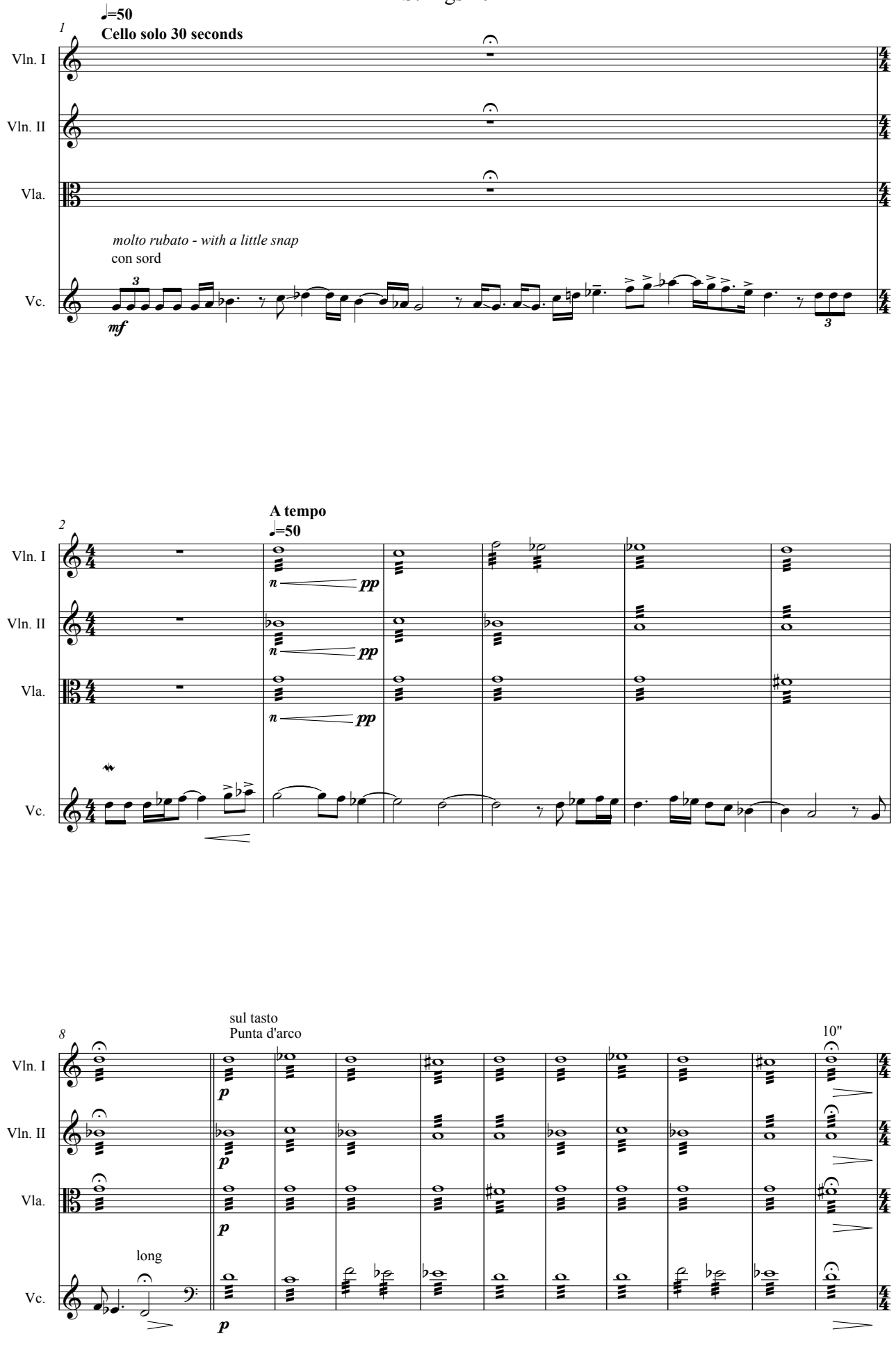


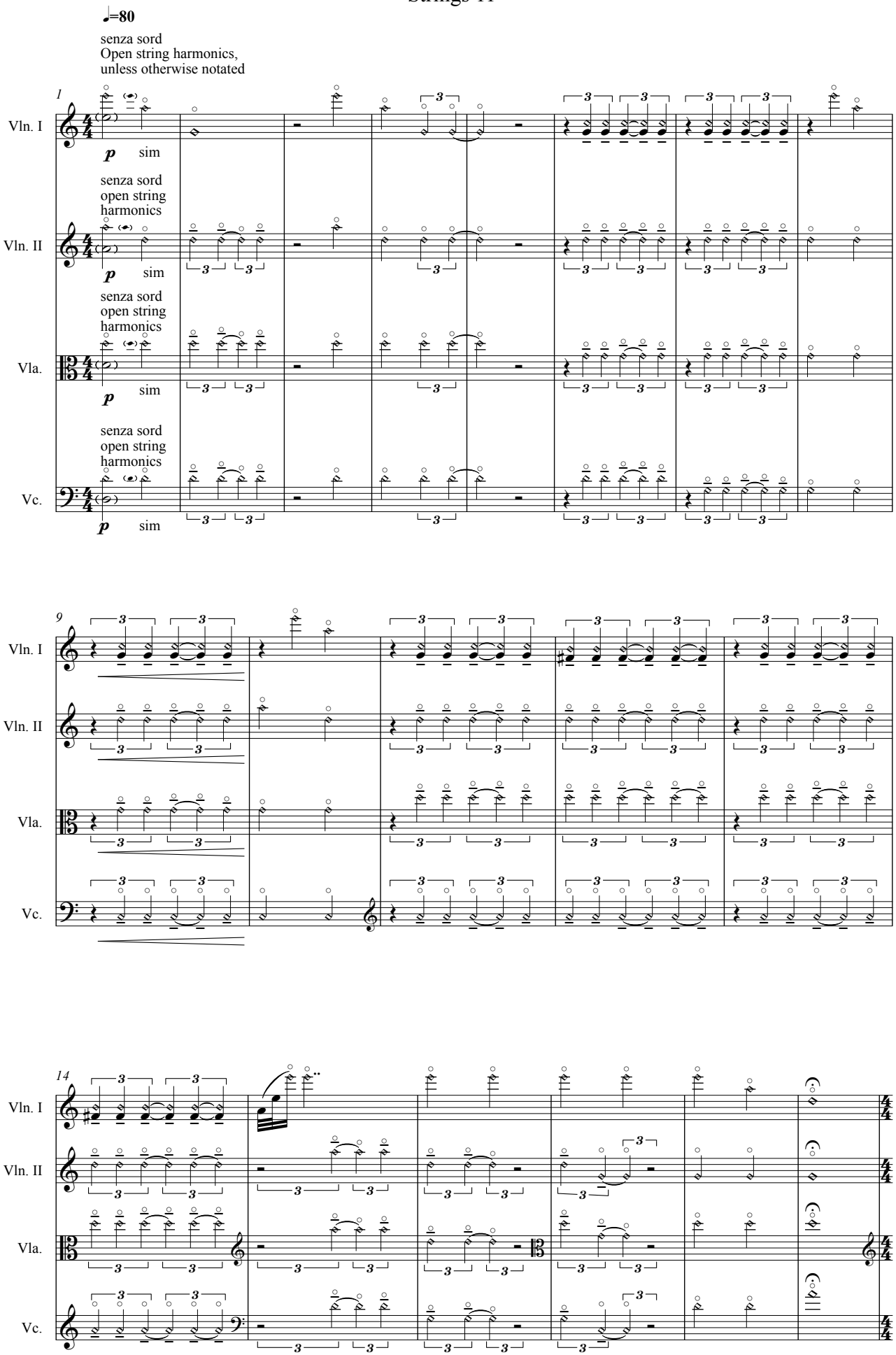


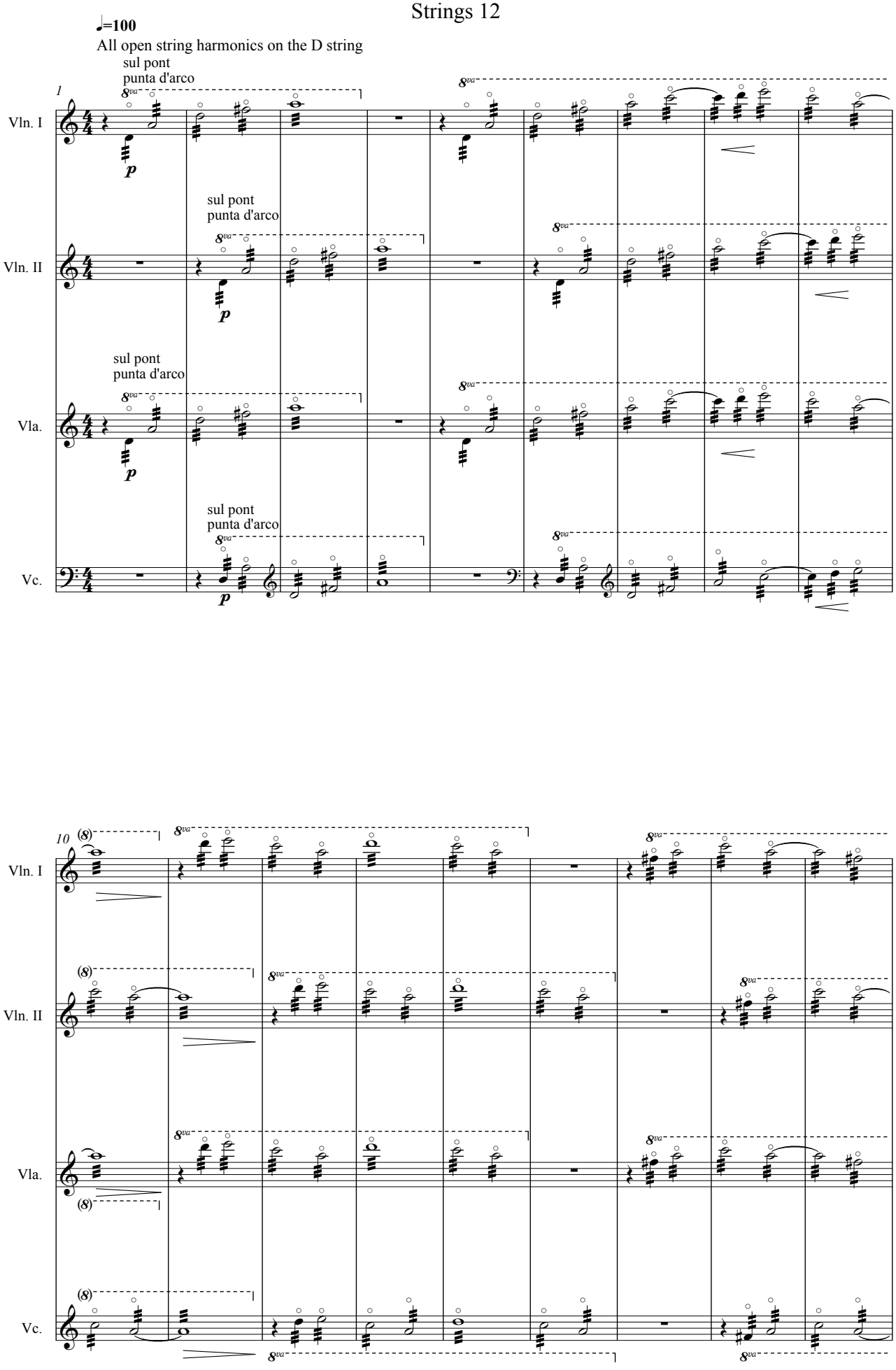


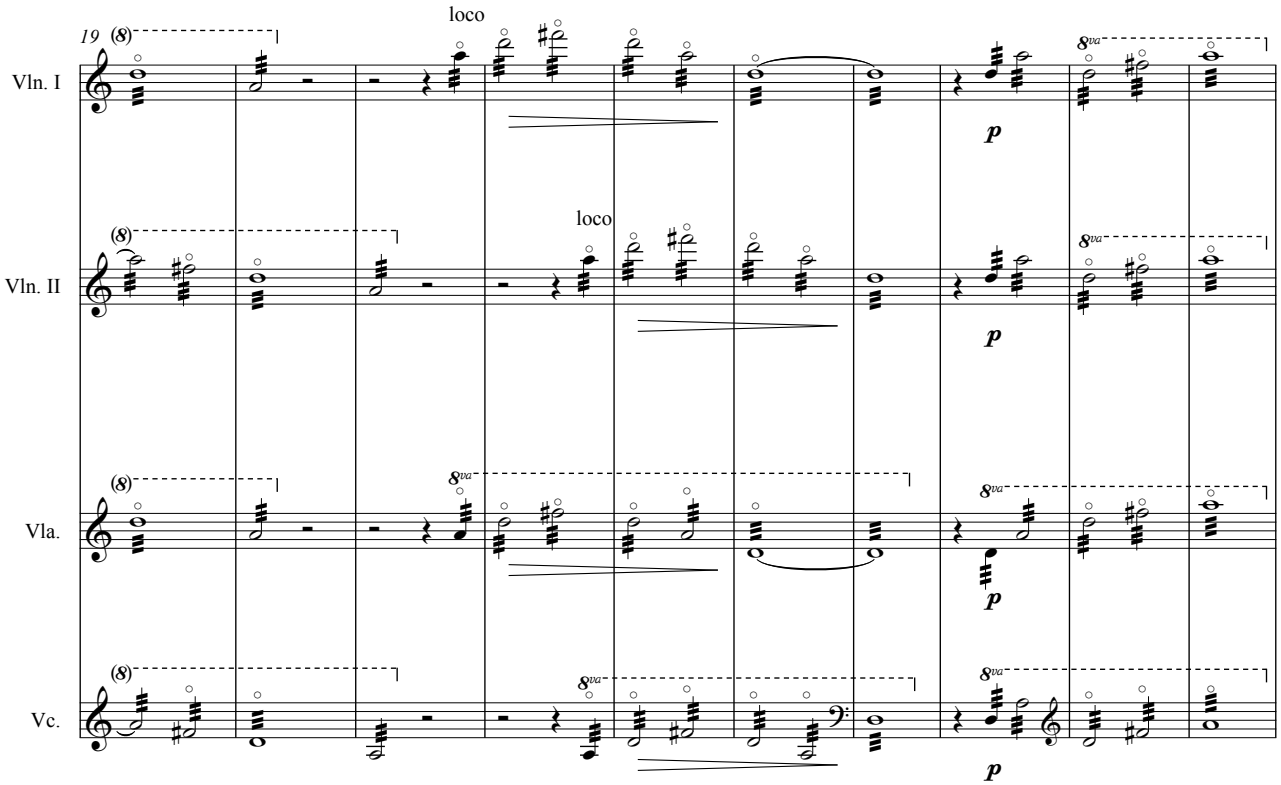

♩=40-50
1
con sord
Vln. I
pp
con sord
Vln. II
pp
con sord
Vla.
pp
Vc.
4
Vln. I
Vln. II
Vla.
Vc.
7
Vln. I
Vln. II
Vla.
Vc.

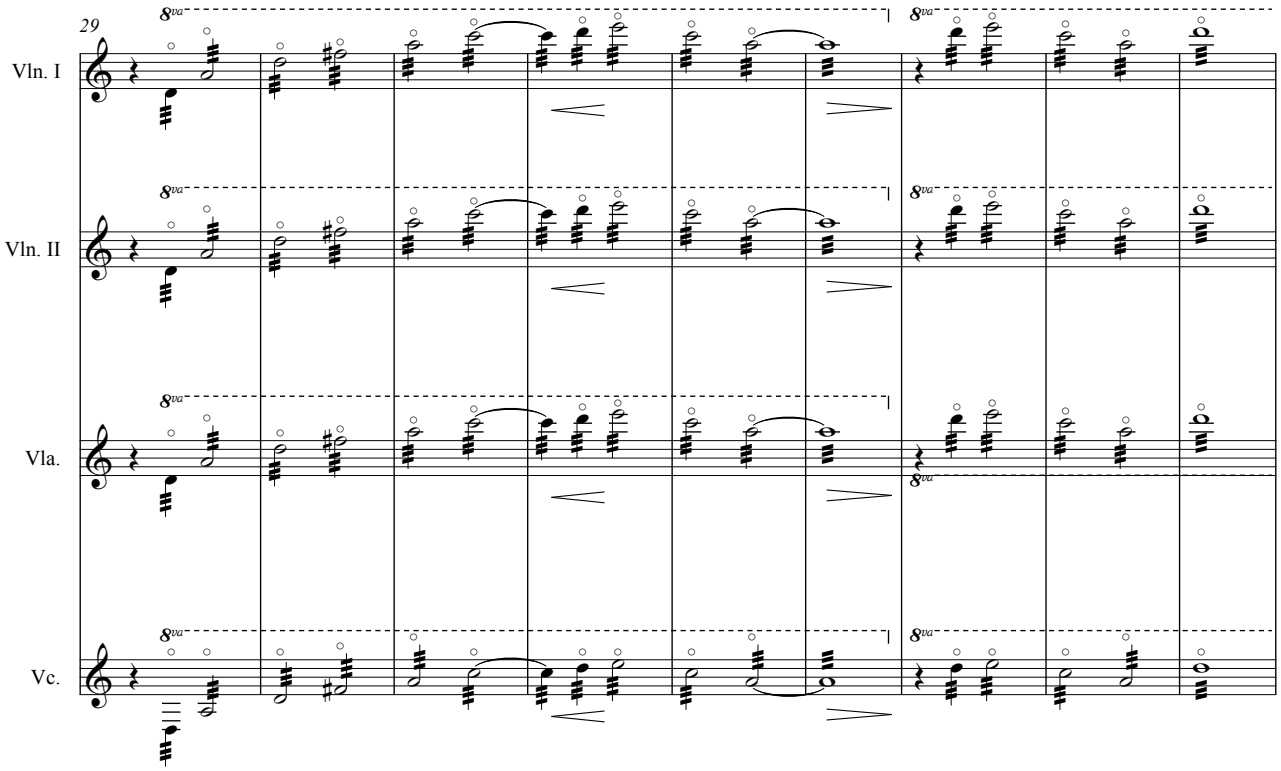

10
Vln. I
Vln. II
Vla.
Vc.
12
Vln. I
Vln. II
Vla.
Vc.
13
Vln. I
Vln. II
Vla.
Vc.

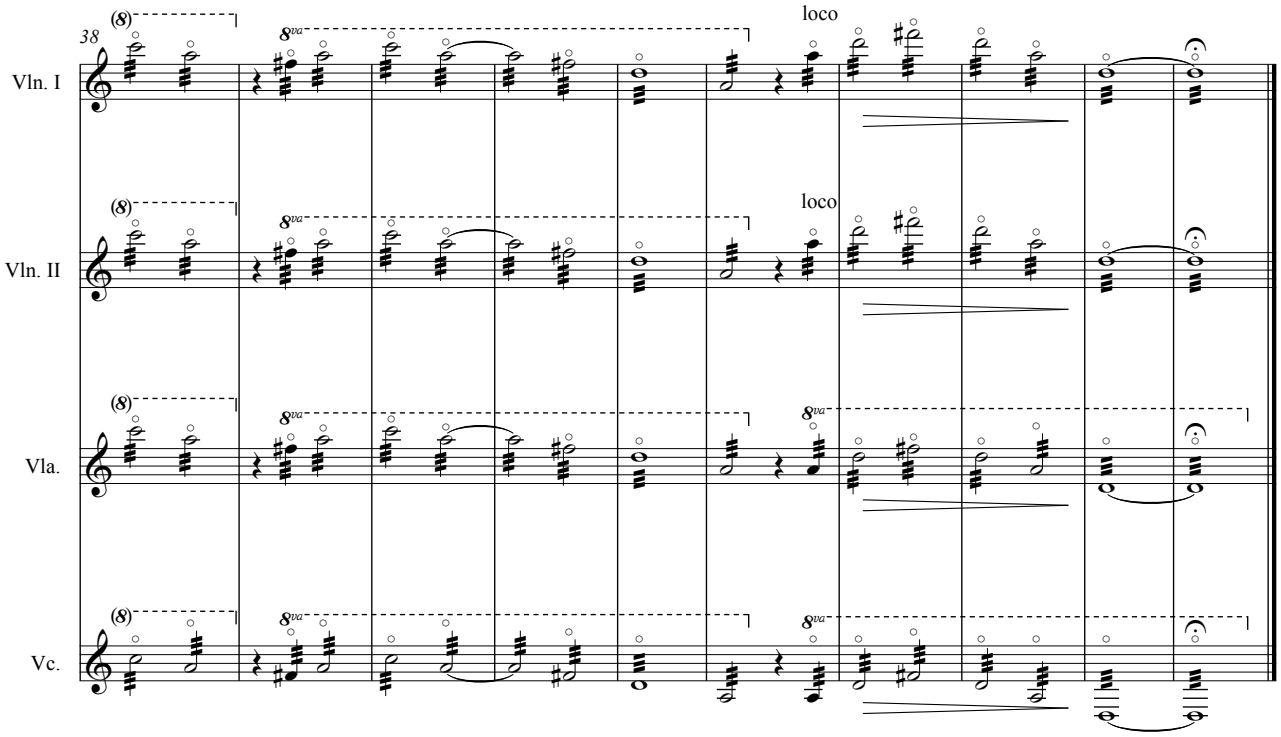

1
♩=50
Cello solo 30 seconds
Vln. I
Vln. II
Vla.
Vc.
molto rubato - with a little snap
con sord
mf
2
A tempo
♩=50
pp
8
sul tasto
Punta d'arco
10"
long
p


♩=80
senza sord
Open string harmonics,
unless otherwise notated
1
Vln. I
Vln. II
Vla.
Vc.
p
sim
senza sord
open string
harmonics
9
14


♩=100
All open string harmonics on the D string
sul pont
punta d'arco
1
Vln. I
Vln. II
Vla.
Vc.
p
8va
10
(8)


19
Vln. I
Vln. II
Vla.
Vc.
loco
loco
p


29
Vln. I
Vln. II
Vla.
Vc.


38
Vln. I
Vln. II
Vla.
Vc.
loco
loco